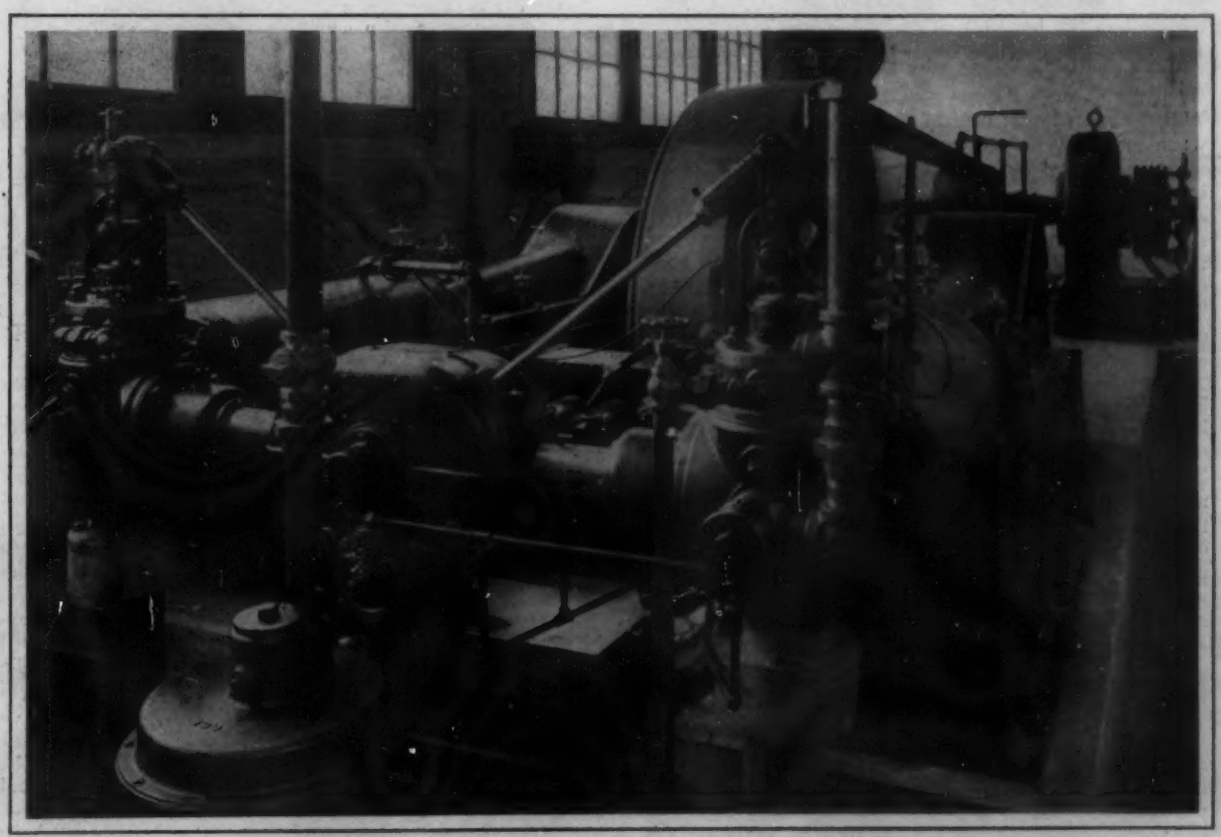
THE IRON AGE

Established 1855 · New York, December 26, 1912 *Vol. 90: No. 26*

An Example of Low Cost Gas Engine Power

Operating Costs in Two Cincinnati Industrial Establishments Using Natural Gas —A Description of One of the Engines

The advantage which sometimes accrues to the industrial establishment located in a natural gas belt is indicated in the experience of two Cincinnati manufacturers who employ gas engines as the source of power. In this section the natural gas averages between 950 and 1050 B.t.u. per cubic foot, a calorific value commonly possessed by natural gas, and the gas is obtainable at 20 cents for 1000 cu. ft. One of the Cincinnati plants which recently installed a gas engine is the Globe Automatic Sprinkler Company on Reading road, Cincinnati, and another is the J. M. Robinson Mfg. Company, which provided a gas engine power plant at its Spring Grove avenue works in Cincinnati where the company manufactures metal working machinery of various kinds. In the case of the latter plant it is possible to compare the earlier experience, as regards operating cost, with a steam power plant.



Gas Engine Power Plant of the Globe Automatic Sprinkler Company, Cincinnati, Ohio

The power plant of the Globe Automatic Sprinkler Company includes an 85-hp. twin-cylinder, four-cycle engine, built by the Miller Gas Engine Company, Springfield, Ohio. A reproduction of a photograph of the equipment is shown in the accompanying engraving. The engine is belted to a 60-kw. direct-current Allis-Chalmers generator, installed under a manufacturer's guarantee not to exceeed 2 per cent. variation in speed between no load and full load. After several months operation at a practically constant load of 40 hp., which it will be noted is far below the rated capacity of the engine, because the Globe company's equipment was not yet all installed, the cost of gas did not exceed $25 a month over the period, with the engine running on full time. This figures a cost of about 62 cents per horse-power per month.

The engine in the Robinson plant is of the same size and type and is similarly developing about 40 hp. The gas bills in this case average $23 to $24 per month, so that in the case of both plants the horse-power cost per month is less than 65 cents. The expense in addition to gas is merely that involved in the cylinder and lubricating oils required, as the foreman in each factory serves as engineer with very little loss of time from his regular work. The Robinson company, with its earlier steam plant, required an engineer at $80 per month and this charge with the coal bill resulted in a cost for steam power of $200 per month.

An interesting feature of the equipment is the use of cooling tanks, so that the jacket water may be used over and over again. As regards the engine itself, its main bearings are of the quarter box type, adjustable in two directions for wear and arranged so that adjustments can be made while the engine is running by means of a swivel wedge. The cross-heads are of steel, of the swivel type, and they are faced with copper hardened babbitt metal with a gib for adjusting the wear. Both the top and bottom guides are made independent of the bed plate.

The exhaust valve is of the balanced type of large diameter to allow for a free exhaust. The valves are water cooled and lubricated at a point where oil does not come in contact with the flame of the exhaust gas. The inlet valves are of the poppet type. The governor is a Jahns high-speed spring-balanced governor and is shown in the photograph. It is actuated by a flexible geared drive and in addition to throttling the quantity of the charge it is designed to secure regulation by varying the mixture of gas and air.

Analysis of the Ball Bearing

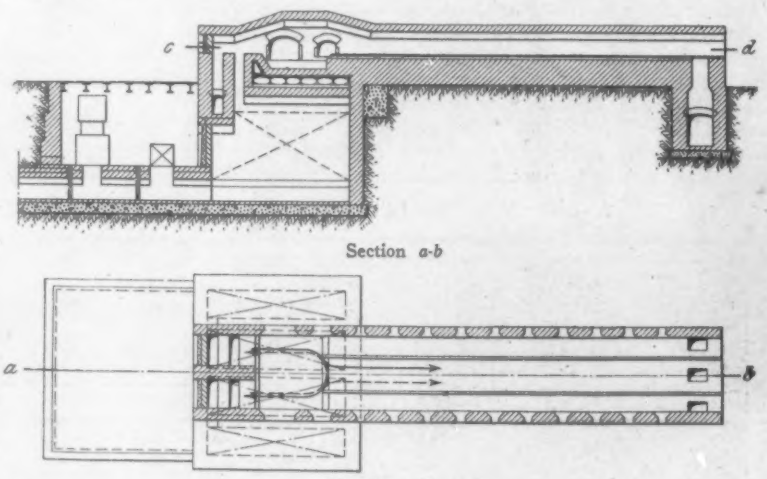
A paper entitled "The Work of Balls and Ball Raceways in Radial and Thrust Ball Bearings with Respect to Friction and Load Relation" was recently prepared for the Society of Automobile Engineers, Metropolitan Section by Franz J. Jarosch, of the J. S. Bretz Company, New York City. It takes up various four-contact, three-contact and two-contact constructions which are examined in order to arrive at the theoretically best location, viz., the two-contact arrangement having the tangents to the points of contact of the balls parallel to the axis of the bearing. It is held that a correct rolling motion of the balls in their raceways can only take place either when the points of contact of the balls with the races lie on conical surfaces or when the points of contact of the balls with each of the races lie in lines which are either parallel or at right angles to the shaft axis. From the consideration that the outer ball-race is concave toward the ball, while the inner race is convex toward the ball, an average "best" radius for both ball-races of 0.6 of the ball diameter has been struck, for both radial and axial bearings.

For the next point taken up, the travel of the balls in their races, a demonstration is made of the fact that in a radial ball bearing the balls have a true rolling motion; the object of the discussion being to show the fallacy, entertained by many, that the balls in such a bearing must necessarily slide when one ball-race rotates while the other is stationary, since the path of travel on the outer race is longer than that on the inner race. The proof that the balls do not slide but have a true rolling motion is illustrated by examining the relative motions in a construction selected as analogous to the radial ball bearing, viz., a set of gears consisting of a concentric gear wheel and an internal gear with a free pinion between these inner and outer gears and meshing with both.

Experiments have shown that it is possible to give the two-contact construction first described about 100 per cent. more radial load than the construction with the ball contacts at 45 deg. with the bearing axis, and about 50 per cent. more load than the construction with the contacts at 60 deg. with the bearing axis, if the same diameter and number of balls are chosen for all three constructions. If the ball bearings of these three types, which are on the market, are compared it is found in the majority of cases that in bearings of the same size the ultimate (right angle) construction shows a greater number and diameter of balls. These bearings are able to withstand not only a comparatively high radial load, but have long life, as has been proved by actual practice. "The reason is that the laterally acting forces and the resultant sliding friction have been eliminated." The paper, it is understood, is the first of a series of studies which Mr. Jarosch is making on the subject.

A New Regenerative Continuous Heating Furnace

A new regenerative continuous heating furnace is described in Stahl und Eisen by Friedrich Siemens, of Berlin. In the last two years 34 of these furnaces have either been built or under construction in Germany and Austria alone, the total yearly output of steel being 2,000,000 tons. This is proof that the new furnace is meeting a real demand. The article contains a carefully worked out theoretical discussion of the operation of continuous heating furnaces. The transfer of heat from the flame to the metal depends on three factors, namely, conduction, convection and radiation. The first two increase in almost direct proportion to the difference in temperature, but the last, according to the Stephan Bolzmann law, increases as the fourth power of the absolute temperature. The radiation, therefore, will finally predominate to such an extent that it is sufficiently exact to assume that the transfer of heat at high temperatures proceeds according to the fourth power of the difference in absolute temperature. This shows the necessity of the highest possible flame temperature to have economical working. Direct firing by means of powdered coal is next discussed, and the present methods of heating the air by recuperation. The new furnace is shown herewith in section and plan. The flame is



Regenerative Continuous Heating Furnace

divided. One part continues and flows through the furnace and the other turns in a horseshoe and passes through the waste gas ports, which are by the side of the incoming ports. The criticism that the flame will not follow this direction is allowable, but as a matter of fact the highly heated regenerative flame divides readily, the two parts burning clearly and freely. Only the part that enters the regenerators comes in contact with the heated steel, and so is especially suitable for heating the checker brick. In this way a proportionately small flame will serve to keep the regenerators at the highest temperatures. The furnace, like all regenerative furnaces, works with natural draft. There is a positive pressure in the high temperature of the hearth so that as the heated steel is removed no outside air enters. The diagram shows clearly the position of the four regenerators. The arrangement of gas and air valves is the same as in the ordinary open hearth furnace, except that the ports are not at opposite ends of the furnace, but side by side at the discharge end. The arrow shows the course of the flame which has been found to be the best under ordinary conditions.

No systematic temperature measurements have yet been made, but the waste gases leave both the charging end and the regenerators at about 300 deg. C. and the average temperature of the air is raised to about 1100 deg. C. In addition to saving in fuel, reduced scaling of steel and lower repair costs, the furnace can be easily regulated to meet changing conditions, such as, for instance, the heating of hard or soft, cold or hot material, in large or small billets. The various ways of altering the flame to get the best results with these materials is illustrated, and the article closes by pointing out how suitable the furnace is for the use of producer gas, coke oven gas, blast furnace gas, or mixtures of these gases. G. B. W.

An Electrical Lift Bridge

The city of Portland, Oregon, has just built an electrically operated lift bridge, of the elevator type. It is shown in the illustrations in its lower position and raised to permit the use of the channel which it spans. It is

Fig. 2.—The Electrically Operated Lift Bridge at the Street Level

claimed that with this design, in addition to greater speed of operation, there is no unequal expansion or contraction, due to the sun's rays, which is experienced with the draw span type pivoted in the center; the wind friction is practically negligible; and the entire channel is rendered available for vessels.

The span is balanced by large concrete counter weights, the steel cables of which operate upon sheaves located at the top of the tower at either side. The lift span is guided in raising and lowering by steel roller bearings which operate in the guides located in the uprights of the tower. The power is from Westinghouse 125-hp. direct current motors of the railroad crane type which are coupled directly to a train of gears located in the machinery house on the top of the span. The reduction gearing operates the bridge by means of steel cables. The bridge was designed by Waddell & Harrington, Kansas City, Mo.

A Motor Driven Grinding Machine

The Oesterlein Machine Company, Cincinnati, Ohio, has applied a motor drive to its No. 2 universal cutter and tool grinding machine to make it a self-contained unit. The countershaft support, consisting of the ribbed cast-iron frame, surmounts upright pipes threaded at both ends, the lower entering the base, which is cast in one piece with a network of strengthening ribs on the inside.

Hoggson & Pettis, manufacturers of Sweetland combination chucks, New Haven, Conn., suffered some inconvenience from a fire which started early in the morning of December 11 in one end of the plant, on the third floor, breaking through to the fourth, where it was confined. The fire itself did but little damage, but the water caused considerable loss. Fortunately, Hoggson & Pettis had a large stock of chucks of every style and size in reserve, both in New Haven and at 103 Chambers street, New York, so that there was no delay in filling orders. The fire had hardly been extinguished before preparations were being made to repair the damage and resume manufacturing. Within a week after the fire the plant was in running order.

Of the transportation and coke situations and their bearing on the pig iron market, Matthew Addy & Co., Cincinnati, say in their trade letter of December 14: "Railroads are making poor time. We have had cars on the road 21 days between Ironton and Hamilton, Ohio, and railroad equipment is hard to get. The coke situation does not improve. On the contrary the coke ovens seem to be having more and more difficulties and apparently it is going to be a struggle to get coke all through the winter."

Fig. 1.—An Electrically Operated Lift Bridge of the Elevator Type in Raised Position

Design of an Open-Hearth Foundry Furnace*

What the Experiences with 25-Ton Furnaces of the Bettendorf Axle Company Have Shown in Point of Construction and Manipulation

BY JOHN H. PLOEHN, DAVENPORT, IA.

The proportion, areas and various main dimensions of the 25-ton basic open-hearth furnaces in operation in the steel foundry of the Bettendorf Axle Company are the subject of this paper. The results obtained in time, quality and life have been exceptional. The average time of 2000 heats in the two furnaces has been 5½ hr. on an average per heat of 22½ tons. The record of these furnaces is a 25-ton heat made in 4½ hr., but all conditions were perfect to make this time. The average analysis of this same number of heats has been: Carbon, 0.205 per cent.; silicon, 0.315 per cent.; manganese, 0.68 per cent.; phosphorus, 0.018 per cent., and sulphur, 0.024 per cent. Initial run of No. 1 furnace, 403 heats; second run of this furnace is now over 609 heats, and it looks as if it is still good for at least forty or fifty more heats. The initial run of No. 2 furnace was 573 heats, and the second run of this same furnace was 401 heats.

These furnaces were designed for using either fuel oil or producer gas, but up to the present time have been operated entirely on fuel oil. The bath is both longer and wider than is ordinarily found in this size furnace. When burning fuel oil a furnace should be much longer than when burning either natural or producer gas; how much is the question. In this case the furnaces are 10 ft. longer than the average gas-burning furnace of the same capacity. On account of this extra length it is possible to obtain complete combustion before the center of furnace is reached, and thence on toward the other port the flame, having lost its cutting action and sharpness, very closely resembles a gas flame in appearance and action. For a 25-ton heat, the bath is neither shallow nor deep, but what could be called a medium depth, which seems to give better, quicker and more uniform quality of metal than either a shallow or a deep bath. The depth of bath for a 25-ton heat is approximately 16 to 17 in. The area of the hearth is 260 sq. ft., which allows a trifle more than 10 sq. ft. per ton.

The general outline and dimensions of the hearth are shown by Fig. 1. At the port ends, it will be noticed that there is no "dog-house or monkey," these being omitted by using water-cooled oil burners. The area of the flues or up-takes leading to the slag pockets is 28 sq. ft. for each end of the furnace. The distance from the hearth-bridge to the under-side of the roof is greater than the width of the ports, and the area at this point is 40 sq. ft. at each end of the furnace.

Particularly when using oil, the construction of the ends of the furnace requires especial care, as the flame is inclined to be extremely sharp and will cut out the ends of a furnace in a short time. This is practically entirely prevented by the extra length before mentioned and the large areas at the points mentioned above.

*Paper, nearly in full, as read before the last meeting of the American Foundrymen's Association in Buffalo.

These furnaces were first designed with a hip roof and with the sidewalls contracted 12 in. at the port ends. After the initial run of each furnace, both the side walls and roof were made straight. With the hip roof and contracted sides, both the roof at the hip, and particularly the side walls at the point of contraction, were cut away on the inside long before the adjoining parts of the roof and walls were badly damaged. The expansion and contraction lengthwise is also better taken care of with straight walls and roof than with the hip roof and contracted ends. A small door is provided in each end of the furnace near the burner, approximately half-way between the top of the hearth-bridge wall and the end of the hearth, and it has been found to be very useful for inspecting the end of the furnace, and also for watching the action of the burners and the flame at this point.

Water-Cooled Burners and Doors and Door Frames

The water-cooled burners, while requiring water for their operation, which in some localities would be quite an item of expense, have a great many advantages which more than offset the cost of the water required for their operation. The most important advantage is the fact that the flame can be correctly located and positively kept in that location, because the burners are left in the furnace at all times. The burner tip, being water cooled, is not liable to give trouble with the oil coking, which is the case with the plain burner.

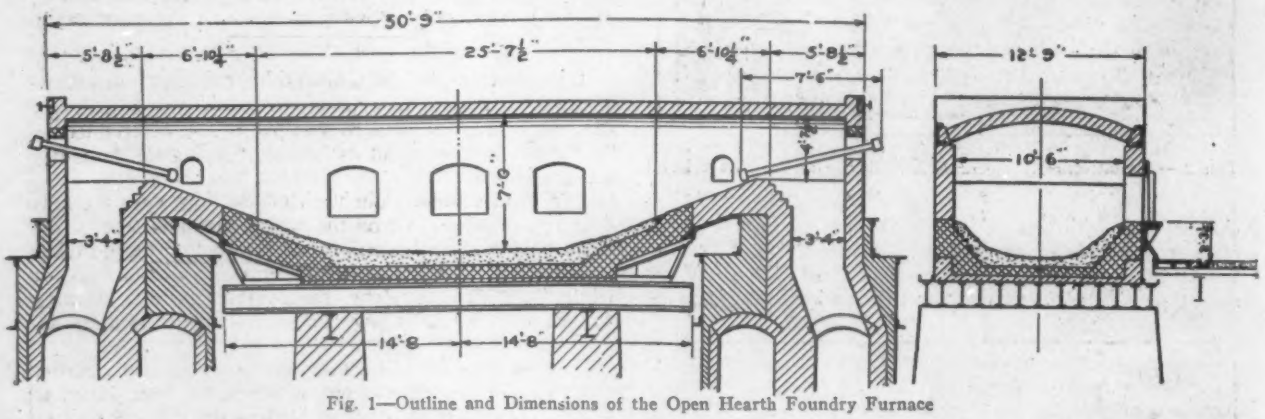


Fig. 1—Outline and Dimensions of the Open Hearth Foundry Furnace

The general outline of the way these burners have been installed on these furnaces is shown by Fig. 2. The burners can be moved horizontally or vertically, and the tip of the burner can be elevated or depressed as may be required. The oil and air connections, being stationary, cause less trouble than on burners where the same are pulled in and out at every reversal of the furnace.

Fig. 2 also shows a further use of the water after leaving the burner. The water from the main is first led into the burner, and from the burner into a bulkhead through which the burner passes. From the bulkhead the water is led to a sewer. The use of this bulkhead is to support the burner, and also makes possible a smaller opening for the burner than through an arch brick opening, and being a cooler wall, lasts much longer and makes it possible and more comfortable for the melter to look into the end of the furnace for inspection of the roof and the flame. With water-cooled burners the furnace is reversed more uniformly and regularly, as it does not require the melter to climb over charging cars, etc., to pull out and shove in the burners, saving a walk of about 100 ft. every 20 min., conserving this time and strength for better purposes.

These furnaces have always been lighted at the slag pockets, which heats the checker brick quicker and is much easier on the new brickwork above, and does away with most of the preliminary heating in the hearth, also keeping

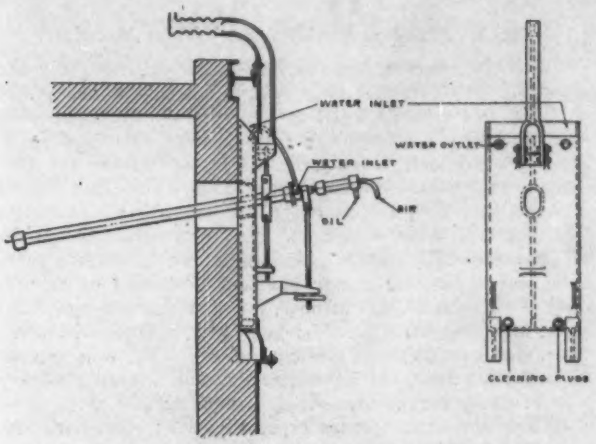


Fig. 2—The Water-Cooled Burner and Bulkhead

ashes and refuse out of the hearth, an important item.

The doors and door frames are water cooled, this feature not only protecting the door jambs, but being an arrangement appreciated by the melters, especially in the summer. The door frames run from 400 to 600 heats, the center frame usually failing first. When the water jackets on the doors are burned out, they are re-lined solid with fire-brick and used during the winter months. The use of coarsely ground chrome ore has been found very valuable for patching door jambs and front and back walls at the slag line. It sinters easily on vertical surfaces and makes a more permanent and lasting repair than magnesite.

Details in Relation to the Slag Pockets

Another advantage in having large areas at the end of the furnace is that the velocity of the outgoing gases is decreased so that the slag is not carried over into the slag pockets in any great masses or in a molten condition. With ample areas, the top of the hearth-bridge wall should also be at least 2 ft. above normal slag line; in this design, this dimension is very nearly 2 ft. 6 in.

A detail that is often overlooked is the intersection of the bridge-hearth and port or flue. This is very often brought up to a square corner, which requires the outgoing gases to continue toward the end walls before going downward. To allow the gases to assume as near as possible their natural flow in turning downward, the intersection of the port and the hearth-bridge should be on an angle of about 45 deg.

During the two runs of these two furnaces, the slag in slag pockets has been in a granular or lumpy state, so that it was easily removed with pick and shovel without injury to the slag pocket walls, in two days after the shutdown. A false bottom of old steel plates covered with brick-bats and silica sand is placed 4 in. above the floor of slag pockets, this air space under the entire slag pocket serving to chill the slag and keep the pockets cooler than if same had a solid floor. The area of the slag pockets is 90 sq. ft.

Silica Brick for the Checkers

The slope of the checker bridge begins 1 ft. inside of slag pocket, and extends into the checker chambers a distance of 7 ft. This easy slope allows free passage of the gases and prevents the retarding of gases due to too abrupt deflection against port ends or the checker chamber roof. The area of opening above checker bridge wall is 28 sq. ft.

The checkers are directly in the rear of the slag pockets and are of very large proportions, the actual volume being 120 cu. ft. per ton. In addition to this extraordinary volume all the checker brick are of silica, and the results so far obtained prove that it is a good investment, taking into account the additional first cost of silica brick over fire-brick.

After both the initial and second run of each furnace, the only repairs required for these checkers was a thorough cleaning, and from their present condition the checker brick will be good for at least another run of 500 heats, and then only the upper five or six courses will probably be replaced with new brick. The silica brick seem to have a greater capacity for storing, and are quicker to absorb heat than clay brick.

The area underneath the checker brick should be large, so that the incoming and outgoing air and gases can distribute themselves uniformly through the various passages between the checker brick. The area of the flues under the checker brick in the air chamber is 12 sq. ft., and in the gas chamber is 8 sq. ft. The area of the flue leading from the checker chambers to the valve is 12 sq. ft. and this same area is maintained through the valve and in the flue leading from the valve to the stack.

For convenience in cleaning out the flues leading from the checkers to the valve when the furnace is down for repairs a cast iron rectangular manhole and cover is placed in the roof of the flue directly back of the center of the checker chambers. This manhole saves considerable time when cleaning out these flues under the checker brick, and so far has not become warped or leaky.

As the area of the flue leading to the reversing valve is practically the determining area, a summary is given below of the various areas mentioned above, assuming this area as unity.

Area under checker chambers	1.66
Area over checker bridge wall	2.3
Area in ports from slag pockets to port ends	2.3
Area over hearth-bridge wall	3.3

To prevent water from accumulating in any of the flues or checker chambers, a drain is located in each flue and chamber, which is connected to a sewer discharging into a deep well, from which the water is pumped by an automatic electric sump pump. A horizontal U trap is placed below each drain, so that the air or gas cannot short circuit or pass from one chamber or flue to another.

With these furnaces was tried radical brick stacks, lined with fire-brick their entire hight. The hight of stacks is 125 ft., and the diameter inside at the bottom is 5 ft. 9 in., and at the top, 4 ft. 6 in. These stacks have been in service for three years, and have as yet shown no cracks or weaknesses. The advantages gained are that they do not require painting every year, do not corrode, and are not affected by gases, and being a poorer conductor of heat, will maintain a higher temperature, and subsequently better draft than a steel brick-lined stack of the same hight.

The Roof of the Furnace

While drying out, and after the oil has been started, the roof of a furnace is a peculiar and particularly tricky structure. The life of a roof is practically determined by the treatment it gets and its behavior during the first fifty heats.

To facilitate letting out the roof tie rods, both the nuts and tie rods are locked on the back or tapping side of the furnace, so that all expansion and contraction can be taken up by loosening or tightening the nuts on the front side of the furnace, saving thereby considerable time and allowing the amount of lengthening and shortening to be more accurately measured.

To prevent getting the roof out of shape in its earlier stages, a roof rigging was put on which has been found to be very useful and effective in holding the true arch shape of the roof until the roof brick are glazed enough to be practically one continuous mass. The rigging is shown by Fig. 3, and consists of three rails extending the entire length of the roof. The rails are suspended from cross beams which are supported on the side buck-staves. Between the rail clamps and the cross beams, wedges can be introduced to bring pressure on any particular rail when the weight of the rail alone is not sufficient. If necessary, the weight of the rail may be lifted entirely and be free from the roof if it should be found necessary. The cross beams are not rigidly connected to the side buck-staves,

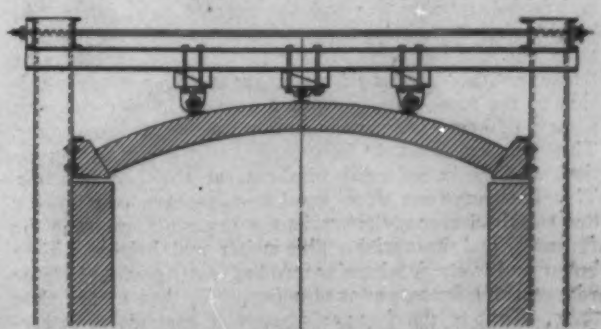


Fig. 3—Method of Holding Furnace Roof in Shape

and the expansion and contraction of the roof are taken up by the tie rods.

With this rigging, the bulging of a thin part of the roof can be controlled and in most cases gradually brought back to the original true arch. An inspection of furnace No. 1, which has this rigging on, shows that the roof still has its original true arch shape and that it has burned off uniformly on the inside, to which, of course, proper credit should be given to the melter for careful handling of the furnace.

On these furnaces, the skew-back channels are rigidly connected to the buck-staves so that the roof is entirely free from the side walls. A space is left below the skew-back channels so that the vertical expansion of the side walls can be taken care of. This keeps the roof practically straight in its length, and thereby makes it stronger and of longer life than if the skew-backs rested on the side walls and moved up and down or varied with the same.

Devices for Improving Furnace Operation

When these furnaces were new, some heats were wild and over-oxidized, and the trouble was finally located as being due to excessive draft under certain weather conditions. To regulate this, a recording draft gauge was installed and this has proved to be a very valuable instrument. An air-controlled butterfly valve is used on these furnaces, and to give the operator warning that the valve is not entirely closed, a small, inexpensive electrical device was installed which lights a light on the platform.

Another cause for oxidized metal was found to be due

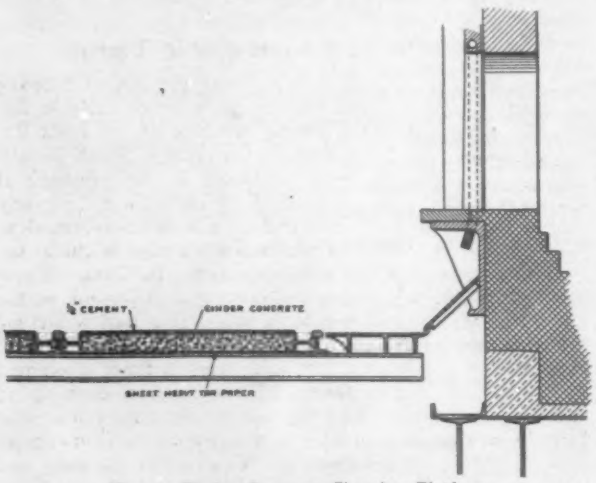


Fig. 4—Cinder Concrete Charging Platform

to the admission of too much air at the reversing valve. To give the operator the necessary information and to prevent guesswork the screw stand on the platform was calibrated to show exactly the number of inches the doors are open. Since this was done the doors are open only about one-half as much as before.

The practice of using too high air or steam pressures has been found to be injurious to quality. For these furnaces, the air pressure during melting the heat is about 60 lb., and during the time of working, about 40 lb.; the oil pressure being slightly higher, or lower, depending on the kind of burner or atomizer used and the distance necessary to pump same.

Various methods have been used to cover the steel plate of charging platforms, but none seem to give perfect satisfaction or able to stand the heat or hard usage. As an experiment, a cinder concrete floor was laid on the steel plate, and of a thickness so as to be level with the charging machine rails. This is shown in Fig. 4. To prevent corrosion of the steel plate in contact with the cinder concrete, a sheet of heavy tar paper was first laid on the steel plate. This floor has stood the hard service of three years' operation, and is in splendid condition at the present time. This flush concrete floor has the advantage of allowing one to wheel across the tracks the materials used for the furnaces, and it furnishes the melter and helpers with a better and surer footing for rabbling out a puddle hole or when tapping heats, and is also far cooler than a bare plate floor. Next to the furnace, removable cast plates in sections of 4 ft. in length are laid even with the rails.

Bins on Charging Platform for Various Materials

Bins for storing the various materials used on the charging platform not only save a waste, but also make a safer and cleaner working floor. They are easily and cheaply built of a bottom plate with sides, ends and partitions riveted to it, leaving the entire side facing the furnace open for easy access for shoveling. The sides extend to a hight to clear the charging machine, and the materials must be kept below that level. It is surprising the amount of materials that can be placed in a small, confined area. The several bins for one furnace are about as long as one-half the length of the furnace, but in them are kept sufficient materials for a week of fluor-spar, magnesite, burned lime, iron ore, dolomite and chrome ore. The bins rest on the concrete floor, but are not fastened in any way, so they can be easily moved in case of furnace repairs.

Thin and light scrap, especially when badly rusted, should be avoided, because not only is the percentage of loss higher in the furnace, but the large amount of oxides is hard on the basic lining and very liable to produce on over-oxidized, or "wild" metal.

To arrive at the proper proportions necessary for different kinds of scrap, a series of test heats was made, in which the percentage of pig iron was varied from 50 per cent. to as low as 31 per cent., the various kinds of scrap making up the remainder of the charge. The percentage of different kinds of scrap was varied according to their carbon content. The pig iron was assumed at 3 per cent. carbon, and the carbon content of the scrap had to be sufficient so that the calculated carbon of the charge was not lower than 1 per cent., with an average of 1.25 per cent. There was a total of approximately 50 heats in this test, and the time of heat, final analysis and kind of metal of any one of these tests did not vary to any appreciable extent from the grand average of all heats.

This proved conclusively that scrap of different carbon content should be kept in separate piles, and the following classifications resulted. Scrap of carbon content up to 30 per cent. is kept in one pile or bin. In this class are structural shearings and short structural sections, couplers and knuckles, and shop scrap. Scrap of carbon content from 30 to 60 per cent. is the second class. In this class are old rails, etc. The last class is scrap of carbon content above 60 per cent. In this class are springs, old rolls, etc.

At this plant, to be able to store an ample supply of charging materials under roof, not only for advantage gained in the winter months, but also to be able to separate the various classes of scrap as mentioned above, huge reinforced concrete bins were built in the furnace bay. The sides and ends of all these bins are 11½ ft. above the floor level, the bottom of the bins extending 4 ft. below the floor to bed rock. Half of the bins are for pig iron, the iron from different concerns, or of "off" analysis being kept separate. The unloading of cars and the loading of charging boxes is done entirely by electric magnets, which makes possible the storage of materials in bins 14 ft. high.

To facilitate keeping these various kinds separate, it is necessary, when purchasing scrap, to specify that the various kinds be shipped in separate cars, and this can be done without additional cost. If it is left to the yard or stock man to make up the charges, usually the scrap that is nearest at hand, or in his way, is sent to the furnaces, the consequence being that some heats melt high and some soft, introducing an unnecessary element of uncertainty in the time and quality of the product. When it can be depended that the heats can be made in certain time, the cycle of smooth operation is reached, in that the time of charging and the work on the molding and pouring floors can be arranged to better advantage.

Hess & Son, successors to the American Tinol Company, 666 North Broad street, Philadelphia, announce that after January 1 their offices and salesroom will be located in the Watkins Building, 1031 Chestnut street, rooms 808-9-11. They will have on hand a complete stock of Tinol in all forms.

The Ralston Steel Car Company, Columbus, Ohio, has called a special meeting of stockholders for December 30, to approve an increase in the capital stock from $2,500,000 to $5,000,000. One-half of the increase is to be 7 per cent. preferred and one-half common stock.

Steel Products in the Package Field

Recent announcements regarding the plans of a new company for the manufacture of a collapsible steel slack barrel were received with interest, which was all the more emphasized because of the rapid strides of this character of container in industries where wood has been the reigning material ever since packages came into use. With prospects favorable to the successful introduction of the new package, it may be worth while to recall some of the lines in which metal is taking the place of the products of the forest.

One of the first instances which comes to mind is in the handling of inflammable and volatile oils and other fluids. The steel cask has been given approval by fire prevention authorities, the transportation companies and the consuming trades, and is a well-established factor in the package field. While in the handling of paints and varnish the wooden barrel still holds a principal place, yet the steel trade is not altogether out of the fight because of the use of steel hoops on all tight barrels made by the cooper. The tremendous consumption of wooden barrels in certain lines in which there is no chance to displace wood, as for instance in the distilling of whiskey, where the charred interior of the barrel performs a chemical function in eliminating fusel oil from the product, makes the tight cooperage trade from a standpoint of steel hoop consumption obviously important.

The barrel trade is extending the use of the steel hoop to the slack barrel, which the new steel barrel is intended to supersede, as the result of a growing scarcity of hoop material. Elm, which is the favored timber used in the manufacture of slack barrel hoops, is scarce and high, and owing to the poorer quality now coming on the market is giving less satisfaction than formerly. Wire hoops have been used for some time with great success in the manufacture of sugar barrels and other high-grade wooden containers, and it is only lately that the steel hoop proper has been applied to the flour barrel. It is likely to be extended to other slack packages where security is desired above all other things, and where a slight addition to the expense is not regarded as prohibitive.

Getting back to the paint trade again, the steel package is also coming into general use for the carriage of comparatively small quantities of lead. Wooden buckets or casks were used for this purpose for a long time, but on account of the difficulty of removing all of the material from them, as well as the expense of inserting the head, followed by corresponding loss of time in removing it, they have not been in favor of late. At first a substitute which was used to some extent was a sheet metal bucket with a wooden top and bottom. This type was used for the 25 and 12½-lb. sizes.

The bucket made of both metal and wood was not altogether satisfactory, however, on account of its tendency to leak; and consequently it has been put aside more recently in favor of the all-steel bucket, used for all sizes of white lead shipments, from 12½ to 100 lb. This container is drawn from a single sheet of steel and has no seams, a big advantage in view of the loss through leakage which affected the package made of combination materials. The all-steel keg is better for the larger sizes, for which wooden buckets were used until recently, on account of the fact that it can be produced just as cheaply, is more sightly than its competitor, and is fire and waterproof.

A point worth noting, too, is that those who purchase white lead—the master painters—like the steel bucket because it can be used for other purposes after the contents have been removed; it is possible to get all of the lead out and then use the bucket for any number of purposes. The tip is clamped on by a single movement of a machine designed for the purpose, eliminating the necessity of using several minutes of cooperage to insert the head used in the bucket made of staves. Consequently, removal of the top does not damage either that part or the bucket proper, something which could not be said of the wooden container.

It is asserted in the paint trade that this form of container will ultimately be used in place of the rectangular tins in which zinc and all kinds of oil colors, putty, ochres, Venetian and Indian reds and the like are shipped. The disadvantages of the rectangular tins include the necessity of boxing or crating, which simply means the use of an additional package, and quite an increased expense, in the aggregate.

Steel tank cars, which are used to carry cotton and petroleum oils, have about driven out the ancient and honorable wooden barrel from these fields; and as a matter of fact, in the handling of cotton oil, about the only case in which barrels are utilized is in the packing of goods intended for export. These go in barrels all the way on account of the absence of tank steamers designed for this special purpose, such as are used in the petroleum trade.

Although the substitution of steel for wood has been referred to chiefly as taking place in the barrel trade, it is also going on in the box business. For example, in the bakery trade, which, it is said, is expanding more rapidly than any other industry in the country, and in the rapidity with which its investments are being increased has outstripped even the automobile industry, a feature of interest is the hamper used for the carriage of bread shipped out of the community in which it is baked. Wooden hampers have been used for this purpose for years, but the corrugated paper box has been making things interesting for it of late, and is being adopted rather freely. A company was organized some time ago to manufacture an all-steel hamper which would last a lifetime, but on account of the increased cost at which these goods were to be sold it has not yet made a great deal of headway. There seems to be a good chance here for a metal container to come into use.

Cigar boxes are made of cedar, either solid or veneered, for the most part. Substitute containers in this field include, among others, glass jars and metal cannisters. The latter are usually covered with paper, and have met with considerable favor.

The World's Largest Cable Tested

It took a pull of 364 tons to break the largest hoisting cable in the world when sections were tested early in December in the 800,000-lb. testing machine of the Fritz Engineering Laboratory at Lehigh University, South Bethlehem, Pa. The tests were conducted in the presence of representatives of the John A. Roebling's Sons Company, manufacturer of the cable, and of the Spanish-American Iron Company, which has been using the rope in the Pennsylvania Steel Company's Mayari mines in Cuba. Three tests were made, all highly satisfactory. A portion of the cable that had been in use for a year and a half withstood a pull of nearly 300 tons.

The construction of this cable was without precedent in rope-making. It consists of six strands, each of 19 wires, twisted around an independent wire rope center, this center having six strands of 19 wires each, twisted around a hemp core. The finished cable was 7810 ft. long and weighed 125,360 lb. Cars with a capacity of 100,000 lb. of ore are lowered by means of this cable down an incline plane 5800 ft. long. Recently it was decided to ascertain the strength of the rope after its year and a half of service, as compared with the strength of portions not worn, and three pieces from the main cable, each about 20 ft. in length, were shipped to the Roebling works at Trenton, N. J. There special yokes were placed on the ends to make possible the tests in the giant machine at Lehigh University.

The Hazard Mfg. Company, Wilkes-Barre, Pa., is distributing a card bearing an illustration of what is characterized as "a freak." This is a very complicated knot tied in a Hazard wire rope. The statement is made that an accident occurred to a shaft engine of the Lytle Coal Company, at Lytle, Pa., whereby the drum was set free and the rope and cage started to drop. The rope was finally torn from the drum, went out of the engine house, over the head sheave and down the shaft. At some point along its course it looped itself into the knot but in so doing not a single wire was broken. This was a most severe test, but the company states that its wire rope is made to meet such strains.

The Engineers' Club, of St. Louis, comprising in various divisions the different branches of the profession of engineering, has completed plans for the construction of a clubhouse. The new president of the club, installed December 17, is John Hunter, chief engineer of the Union Electric Light & Power Company, St. Louis.

The Case of the Oil Engine

Comparative Estimates of Operating Costs of Different Power Production Combinations

At a meeting December 4 at the Hotel Walton, Philadelphia, of the Philadelphia Foundrymen's Association, William T. Price, manager of the power department of the De La Vergne Machine Company, The Bourse, Philadelphia, presented a paper on oil engines. He contributed some comparative estimates of the cost of producing power for the industrial establishment by different forms of prime mover and different forms of fuel energy and from the paper the following notes have been taken:

"I am frequently asked about the future supply of fuel for the oil engine. The parties we find least concerned about this matter are the oil producers themselves and all those familiar with the oil situation. The important fact is that we can afford to burn oil in the oil engine at a higher price than it can be used for other purposes. I know a number of oil consumers who will discontinue the use of that fuel in their furnaces just because the present rise in price makes it too expensive. The natural outcome will be that the oil supply will gradually be given over to oil engines. At present, the De La Vergne Machine Company's power plant is being operated on water-gas tar, which is a cheap coal by-product from the gas works. This is found in almost all large cities and can be purchased at a low price.

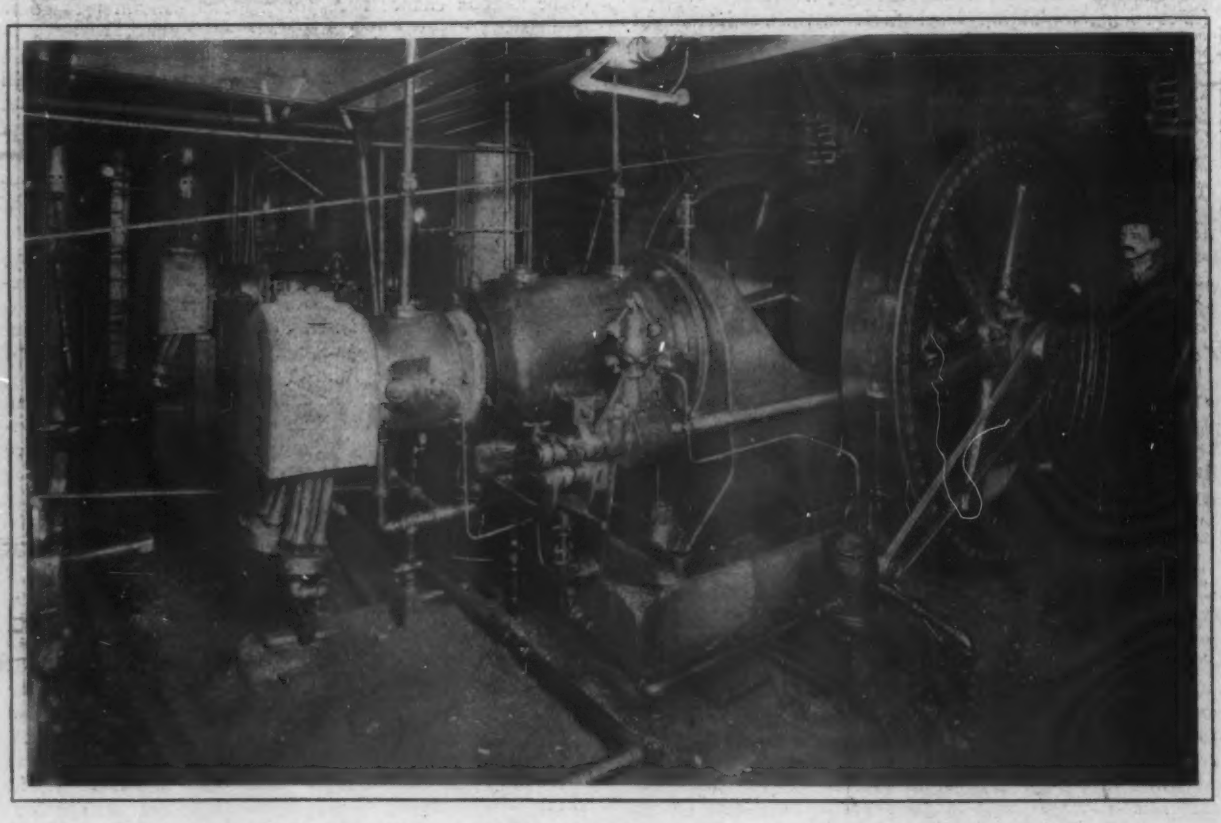
"However, at this period we are assured of a plentiful supply of Mexican crude oil and last week this was offered by the Standard Oil Company, at 3¼ cents per gallon, tank car lots, fo.b. Bayonne. It is a fine fuel for the De La Vergne FH-type engine giving over 16 b.h.p. hr. per gallon. When the Panama Canal opens California oil will also be available, if necessary, but the Mexican fields will probably supply all our needs for many years."

An accompanying table shows the operating cost of a 50 hp. engine at C. R. Carver Company's plant in Philadelphia, compared with the estimated operating costs with other powers. A second table shows the actual results obtained at Snead & Co. Iron Works, Jersey City, N. J., for a period of 24 months together with the estimated cost of producing the same power with producer gas and steam. This plant was chosen by the author for comparison because it was the first installation of the FH engine and because careful records have been kept.

With the present high price of gasoline, the author remarked in the course of the paper, manufacturers are putting out a modified gasoline engine which, though often called an oil engine, should be termed a distillate engine. The exhaust pipe is jacketed so that after the engine is started on gasoline, and the exhaust pipe has become hot, the incoming air may be drawn through the jacket and heated. The heated air enables the carburettor to vaporize distillates heavier than gasoline, such as kerosene, gas oil, 38 deg. distillate and other light petroleum fractions. Another type is arranged so that the distillate is itself pre-heated by the exhaust.

This type will seldom burn the regular fuel oil, which is the refuse from the refinery, and a standard commodity, and he claims it has the gasoline engine's disadvantage of electrical ignition and carburettor with the added one of increased cylinder carbonization. Some distillate engines are arranged so that water is admitted to the cylinder to improve combustion, but this requires careful adjustment and unless distilled water is used, carbonates of lime, etc., may accumulate and cause serious wear to cylinder and piston.

Mr. Price drew attention among others to a 400-hp. twin-cylinder engine installed at the works of Crucible Steel Casting Company, Lansdowne, Pa., and direct connected to an alternator. The plant furnishes current to a combination induction furnace of 2 tons capacity, which displaces the present crucible furnaces. A surprising condition is brought out by this installation and it is attributed to the high efficiency of the oil engines; namely, that it is possible to change the heat energy in the oil to motive power, then to electric power and then back to heat energy in the metal with a consumption of only one-third of the fuel used directly in the crucible furnaces. Furthermore, there is an additional saving of no small amount due to the elimination of crucibles. The oil engine the author regards as an ideal prime mover for electric furnace work.



Two 50-hp. Hornsby-Akroyd Oil Engines in Plant of John M. Melloy's Sons, Philadelphia. Warren-Paxson Exhaust Heaters in Left Background

Comparison of Operating Costs of 50 b.h.p. Plant of C. R. Carver Company, Philadelphia

One 50-hp. Hornsby-Akroyd oil engine belted to shaft. Average load 30 b.h.p.; 10 hr. per day. Daily power consumption, 30 x 10 = 300 b.h.p. hr. Fuel oil consumption, 300 lb. @ 7½ = 40 gal.

Daily fuel cost, 4½c. per gal.	$1.80
Attendance 1½ hr. @ 20c.	.30
Lubrication and supplies	.20
Total	$2.30

Annual expenditure, $690.

City Gas Engine

Daily gas consumption (20 cu. ft. per hp. hr.), 6000.	
Daily fuel cost, 6000 cu. ft. @ $1	$6.00
Attendance 1½ hr.	.30
Lubrication and supplies	.15
Total	$6.45

Annual expenditure, $1,935.

Steam Engine

300 b.h.p. hr. = 340 i.h.p. hr.; coal at 7 lb. per i.h.p. hr. = 2380 lb.

Daily fuel cost, 1.06 tons @ $3	$3.18
Attendance	2.75
Lubrication and supplies	.25
Total	$6.18

Producer Gas

Daily coal consumption at 1.4 lb. per b.h.p. hr., 420 lb.

Daily fuel cost, 0.19 ton @ $4.25	$0.81
Attendance, ¾ of one man's time, @ $2.75	2.06
Lubrication and supplies	.25
Total	$3.12

Annual expenditure, $936.

Electric Power

300 b.h.p. hr. = 250 k.w. hr.

Daily power cost @ 2c. per k.w. hr.	$5.00
Daily power cost @ 2½c. per k.w. hr.	6.25
Daily power cost @ 3c. per k.w. hr.	7.50
Daily power cost @ 4c. per k.w. hr.	10.00

Total k.w. hr. output	369,684
Total b.h.p. hr. output (by calculation)	552,217

Average load, 54.2 per cent. of rated load.

Fuel oil, 38,211 gal. @ 3¼c.	$1,240.00
Lubrication	228.72
Miscellaneous supplies	123.20
Labor and attendance	1,361.42
Total expenditures for 2 yr., 54.2 per cent. load	$2,953.34

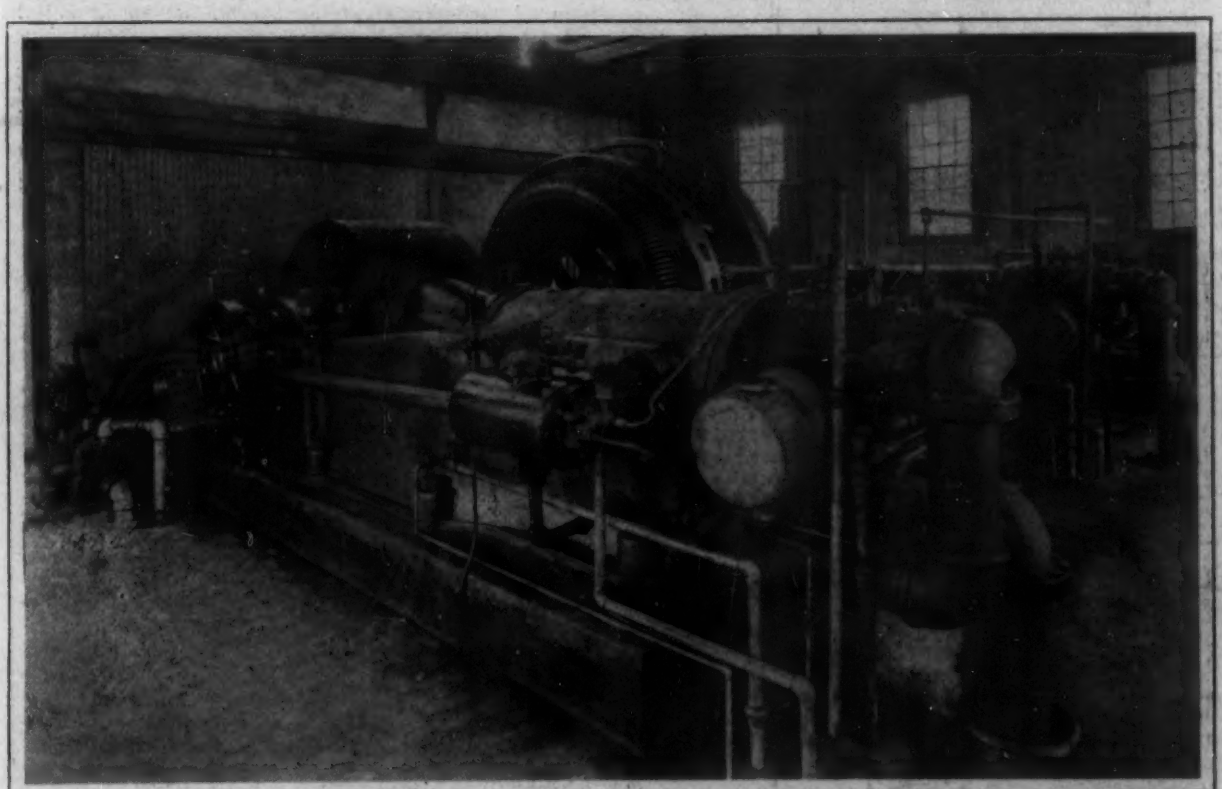
	Actual per annum 54.2 per cent load	Estimated for 100 per cent load
Total k.w. hr.	184,842	341,000
Total b.h.p. hr.	276,108	510,000
Oil consumption per b.h.p. hr.	0.508	0.5
Fuel oil consumption, gal.	19,106	34,700
Fuel oil @ 3¼c. per gal.	$620.00	$1,125.00
Lubrication	115.00	115.00
Labor and attendance	682.00	682.00
Miscellaneous supplies	62.00	62.00
Total annual expenditures	$1,479.00	$1,984.00
Cost per k.w. hr	.008	.0058
Cost per b.h.p. hr.	.0053	.0039

Oil Engine Plant

Expenditures per annum	$1,479.00	.....
Cost per k.w. hr.	.008	.....

Producer Gas Plant

Pea anthracite coal, 1.5 lb. per b.h.p. hr., at 54.2 per cent. load; 1.25 lb. at 100 per cent. load, which includes standby losses, tons.



A 400-hp. Twin Cylinder Oil Engine Direct-Connected to Alternator at Plant of Crucible Steel Casting Company, Lansdowne, Pa., for Electric Furnace Work

Gasoline Engine

Daily gasoline (7 b.h.p. hr. per gal.), 43 gals.

Daily fuel cost @ 16c. gal.	$6.90
Attendance, 1½ hr.	.30
Lubrication and supplies	.15
Total	$7.35

Annual expenditure, $2,205.

Comparison of Oil Engine Proposition with Electric Power at 2½c per K.W. Hour

Approximate cost of oil engine installation	$3,000.00
Approximate cost of motor	500.00
Difference in cost of installation	$2,500.00
Annual expenditure with electric power, $6.25 x 300	$1,875.00
Annual expenditure with oil engine	690.00
Annual difference in expenditures	$1,185.00
Interest at end of first year on $2,500 @ 6 per cent.	$150.00
Net savings, $1,185 — $150	1,035.00
Charging off this amount leaves	1,465.00
Interest at end of second year on $1,465 @ 6 per cent.	$88.00
Net savings, $1,185 — $88	1,097.00
Charging off this amount leaves	368.00

Three months additional will wipe out the entire difference in cost, and from that time on there will be a net saving of $1,185 per annum.

Comparison of Operating Costs of 180 b.h.p. Plant of Snead & Co. Iron Works, Jersey City, N. J.

One 180 b.h.p. De La Vergne Type FH oil engine, direct connected to 125 k.w. 500-volt, d.c. generator.

Plant operated 588 days, or 5985 hr. (2 years), as follows:

Coal tons	185	284
Cost of coal per annum at $4.25 per ton	$786.00	$1,208.00
Lubrication	115.00	115.00
Miscellaneous supplies	62.00	62.00
Labor and attendance	682.00	682.00
Producer attendance, extra	500.00	500.00
Annual expenditures	$2,145.00	$2,567.00
Cost per k.w. hr.	.0116	.0075

Steam Plant

Annual coal consumption 5 lb. per i.h.p. hr. = 5.5 lb. per b.h.p. hr. at 54.2 per cent. load and 4.5 lb. at 100 per cent. load (including banking).

Long tons	678	1025
Cost of coal per annum @ $3 per ton	$2,035.00	$3,080.00
Engineer @ $3 per day	900.00	900.00
Fireman @ $1.50 per day	450.00	450.00
Lubrication	100.00	100.00
Supplies	100.00	100.00
Annual expenditures	$3,585.00	$4,630.00
Cost per k.w. hr.	.0195	.0136

Electric Power

Cost per k.w. hr.	$ .015	$ .015
Annual expenditures	2,760.00	5,110.00
Cost per k.w. hr.	$ .02	$ .02
Annual expenditures	3,700.00	6,820.00
Cost per k.w. hr.	$ .03	$ .03
Annual expenditure	5,340.00	10,220.00

Reversing Electric Motor Machine Drives

Tests of Planing Machines Driven by Reversing Belts and Reversing Motors

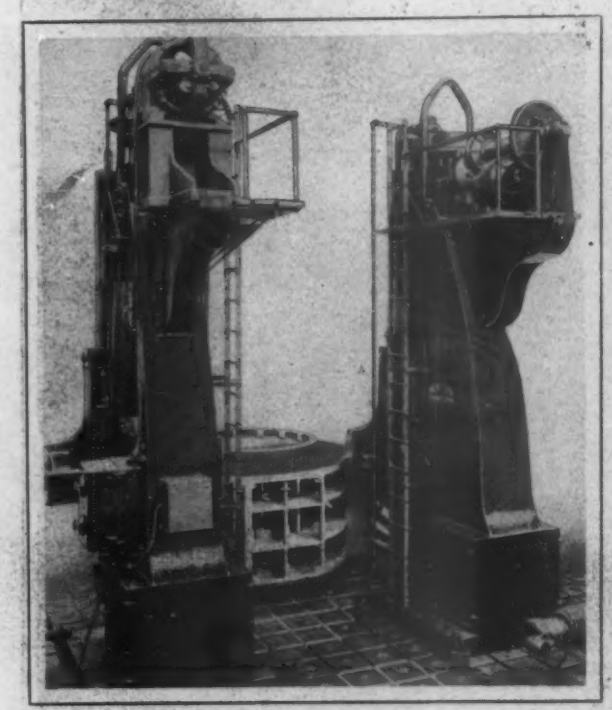
The idea of applying reversing motors direct connected for driving planers has been in practice for some eight or ten years, though more or less of an experiment up to a year or so ago. The use of this form of drive, even in the first stages of its development, emphasized strongly that it possessed many advantages over older methods of reversing through clutches or belt shifters. Not only is the usual economy generally effected in the consumption of power through application of the principle of direct connected individual operation, but maximum cutting speeds are sustained uniformly, acceleration is rapid on the return travel and an increased production results. The reversing motor drive has ushered in new records in machining castings, and it has seemed timely to present in this, the last issue of the year, the observations which have been made by the General Electric Company. Accordingly the following notes received from F. H. Gale, advertising manager of the company, are offered in this connection.

The General Electric Company has recently placed on the market a reversing adjustable-speed direct-connected motor drive that has been tested and tried out in service. Probably the most interesting application of this drive to machine tools at the present time is to planing machines, viewed both in the light of an engineering achievement and from the standpoint of production, but the reversing motor equipment is used not only to drive planing machines, but also screw, worm and rack-driven slotting machines, turret lathes, wire and tube drawing machinery, and other classes of machines reversed through clutches or shifting belts. The General Electric reversing motor drive incidentally is designed to be attached to machines already installed and in use as well as to new machinery.

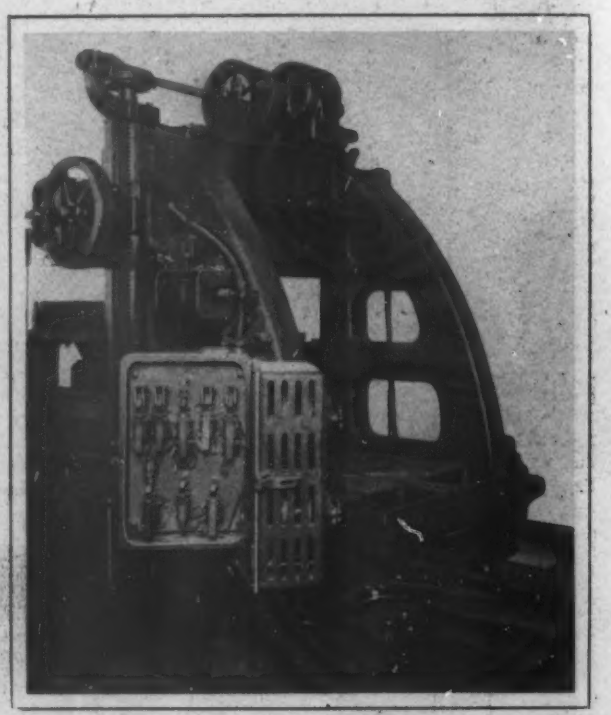
In the event of attaching the reversing motor to machines already in use, the speed of the driving shaft on the majority of planers will be low enough with the slowest cut to meet the motor speed of 250 r.p.m., and only a coupling and the necessary motor foundation will be needed. If, however, the planer gearing is of such a ratio that the speed of the driving shaft, when making the slowest cut required is lower than the motor speed, 250 r.p.m., an intermediate gear and pinion have to be installed for the reduction. In the latter case an outboard bearing should be provided, which can be taken care of either by motor shaft extension, or, if the standard motor shaft be used, by a special pinion with shaft extension for the outboard bearing. Where the motor is coupled direct to a planer shaft driving through bevel or worm gearing, provision should be made for taking care of the thrust.

Suitable planer dogs are furnished in each instance. Should there be a boss or web directly behind the position of the operating lever, the bracket supporting the lever can be extended and mounted on a strap suitably bent for the purpose. The complete equipment comprises the circuit breaker, motor, contractor control, with pendant switch if desired, master switch, two dogs, main operating lever, auxiliary operating lever and bearings for the auxiliary shaft. On account of variance in location, bends and length in individual machines, the auxiliary shaft and the connecting rods from this shaft to the operating lever and master switch are not included.

As a general proposition, the saving arising from apply-



Newton Slot Cutting Machines, One Driven by a 20-hp. and the Other by a 10-hp. Motor



A 48 In. x 12 Ft. Pond Planer Driven by a 20-hp. Motor, Showing Controller Panel Open

TWO EXAMPLES OF MACHINES PROVIDED WITH REVERSING ELECTRIC MOTORS

Tabulation of Tests of Machines Reversed by Electric Motors and by Belts

MACHINE		Type Drive	Size Motor H.P.	Input Amp.	Cut In.	Stroke	NOT CUTTING		CUTTING		RETURN		Cut Total Cycle Sec.
Type.	Size						Ft. per Min.	Time Sec.	Ft. per Min.	Time Sec.	Ft. per Min.	Time Sec.	
Planer	36"x10'	Belt	10	33	1x1-16	8'6"	31.9	16	28.3	18	72.8	7	25
Planer	36"x10'	Reversing	10	51	1x1-16	8'6"	53.2	9.6	52.7	9.8	91	5.6	15.4
Planer	36"x10'	Belt	10	38.5	1x1-16	8'6"	33.3	15.4	28	18.2	72.8	7	25.2
Planer	36"x10'	Reversing	10	56	1x1-16	8'6"	53.7	9.5	53.2	9.7	91	5.6	15.3
Planer	72"x22'	Belt	40	95	1x1-16	10'1"	22.9	26.4	17.1	35.4	59.3	10.2	45.6
Planer	72"x22'	Reversing	35	120	1x1-16 1x1-16	10'1"	34.8	17.4	34.4	17.6	73.7	8.2	25.8

ing power direct to machine tools is considered the amount of friction load which has thus been eliminated. This often reaches as much as 50 per cent., yet it is in reality only a small part of what may be realized, as proved by numerous tests. A belt-driven planer, or other machine, of approximately 10 hp. capacity, running at a cutting speed of 25 ft., will drop in speed 2½ to 5 ft., or 10 to 20 per cent., while cutting to a value of 10 hp., if this approaches the carrying capacity of the belt, due to size, speed or slackness. If the cutting speed be increased to 50 ft. with the same depth of cut and feed, the speed will fall while cutting to nearly what it was originally, the power input increasing only slightly or to the limit of the belt capacity. The maximum slip will be reached when the machine is stalled, the power input remaining approximately constant and the loss being entirely due to friction from belt slippage. This slippage loss is demonstrated in the tabulation of tests made with a recording ammeter and given herewith. The motors used were all 230 volt. The speeds noted are average feet per minute for complete cutting and return strokes.

Briefly summarized, the salient operating features claimed by the manufacturer for the reversing adjustable speed direct connected motor drive are: maximum cutting speed sustained uniformly, affording greatly increased production; rapid acceleration on the return stroke; reverses remarkably close to a line at the end of the cut; very economical operation and upkeep; any speed desired within a ratio of four to one; many speed combinations, allowing the slowest cutting and highest return speed to be combined; freedom from shocks, permitting the quickest reversals possible without jar; quiet operation; sparkless commutation, and positive and safe control within easy reach of the operator.

October Iron and Steel Exports and Imports

The report of the Bureau of Foreign and Domestic Commerce, Department of Commerce and Labor, shows an increase in both the exports and imports in iron and steel in October, as compared with the figures for September. The total value of the exports of iron and steel and manufactures thereof, not including iron ore, in October was $25,273,059 against $23,286,040 in September, while the value of similar imports was $2,773,916 as compared with $2,602,795 in September.

The exports of commodities for which quantities are given total 250,746 gross tons in October, against 248,743 tons in September and 186,456 tons in October, 1911. The details of the exports of such commodities for October and for 10 months ended with October, compared with the corresponding periods of the previous year, are as follows:

Exports of Iron and Steel

Commodities	October		Ten months	
	Gr. tons 1912	Gr. tons 1911	Gr. tons 1912	Gr. tons 1911
Pig iron	29,408	6,386	223,387	101,711
Scrap	9,354	7,511	88,675	69,523
Bar iron	1,958	1,208	18,129	15,087
Wire rods	4,167	3,375	52,346	16,205
Steel bars	19,077	9,563	168,851	103,269
Billets, ingots and blooms	29,969	21,783	254,415	202,961
Bolts and nuts	1,399	.....	6,820	.....
Hoops and bands	1,959	754	9,956	2,343
*Horseshoes	61	.....	276	.....
Cut nails	411	697	8,442	8,893
*Railroad spikes	1,142	.....	4,278	.....
Wire nails	4,062	4,964	60,425	40,119
All other nails, including tacks	290	1,380	7,498	10,964
Pipes and pipe fittings	18,542	13,658	210,858	163,477
*Radiators and cast iron house-heating boilers	620	620	4,426	3,270
Steel rails	26,127	22,918	379,247	372,860
*Galvanized iron sheets and plates	9,205	13,458	49,328	98,515
All other iron sheets and plates	1,734		119,539	
*Steel plates	26,108	24,012	95,663	191,235
*Steel sheets	13,932		42,403	
Structural iron and steel	24,154	19,134	241,499	177,591
Tin and terne plates	5,696	7,117	72,519	49,673
Barbed wire	9,355	11,722	80,768	74,862
All other wire	12,016	11,196	127,838	106,657
Totals	250,746	186,456	2,327,676	1,809,215

*Not separately classified prior to July 1.

The imports of commodities for which quantities are given total 25,557 gross tons in October against 18,740 tons in September and 21,034 tons in October, 1911. Details of such imports for October and for 10 months ended with October, compared with the corresponding periods of the previous year, are as follows:

Imports of Iron and Steel

Commodities	October		Ten months	
	Gr. tons 1912	Gr. tons 1911	Gr. tons 1912	Gr. tons 1911
Pig iron	13,388	10,444	102,945	126,318
Scrap	4,118	2,105	17,232	16,476
Bar iron	3,089	2,339	21,227	23,169
*Structural iron and steel	627	529	2,501	1,135
Billets, bars and steel plates n. e. s.	1,714	3,358	15,435	26,603
*Steel rails	218	468	3,072	1,149
Sheets and plates	225	248	2,857	1,936
Tin and terne plates	282	574	1,784	13,443
Wire rods	1,896	969	12,632	12,097
Totals	25,557	21,034	179,685	223,346

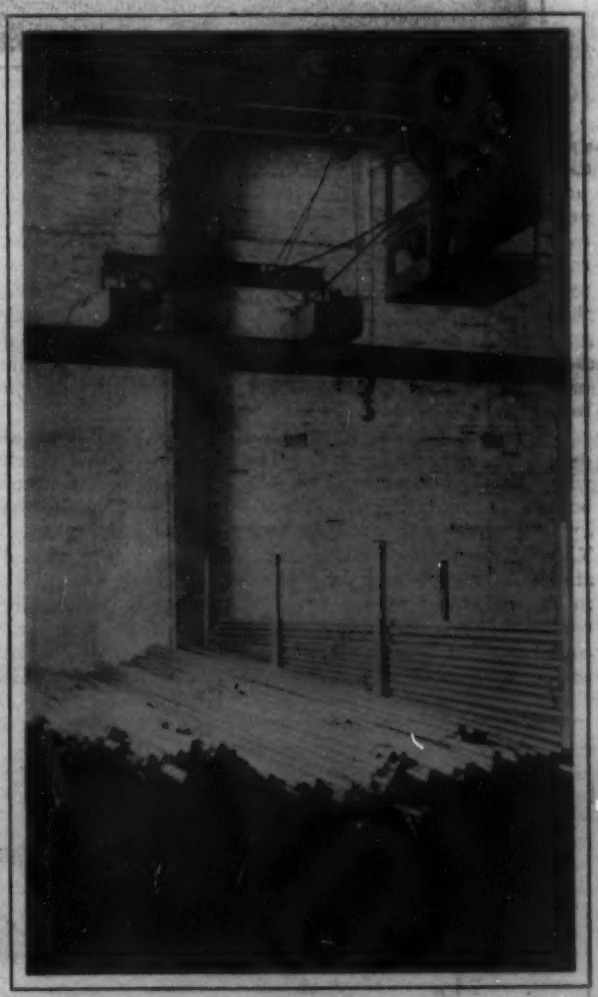
*Included in "all other manufactures of iron and steel" prior to July 1, 1911.

The total value of the exports of iron and steel and manufactures thereof, not including iron ore, for 10 months ended with October, was $238,972,631 against $199,209,431 in the corresponding period of 1911. The total value of the imports of iron and steel manufactures thereof, not including iron ore, for 10 months ended with October, was $23,885,776 against $24,663,544 in the corresponding period of 1911.

The imports of iron ore in October were 202,125 gross tons against 180,571 tons in September and 172,459 tons in October, 1911. The imports for the 10 months ended with October were 1,741,607 gross tons against 1,534,811 tons in the corresponding period of 1911.

A Lifting Magnet for Storing Iron Pipe

The Globe Automatic Sprinkler Company, Cincinnati, Ohio, is employing a Cutler-Hammer lifting magnet operated in conjunction with a crane of the Euclid Crane



A Lifting Magnet Crane for Handling Pipe

& Hoist Company, Cleveland, Ohio, to handle pipe which is used in large quantities in the creation of automatic sprinkler system. The crane operates from the mezzanine floor on the west side of the shop on an overhead track which extends out over the railroad sidetrack. A car of any sized pipe can be unloaded and stored in the proper racks by two men much more quickly than the task would be accomplished by the usual means with a much larger force.

The Automatic Galvanizing of Tubes

Apparatus Employed at a German Plant with a Considerable Saving Over Hand Work

In a recent issue of Stahl und Eisen an arrangement is described that has been in successful operation for the last three years at Laurahütte, Upper Silesia, for the hot galvanizing of tubes. The writer is Engineer G. Buchert of Laurahütte. A general view is shown in Fig. 1, and a drawing in Fig. 2. The tube *a* is drawn out at one end of the zinc bath *b* and passed through the arrangement *c* for removing the excess spelter from the outside and smoothing the surface. It is gripped in tongs attached to a specially built transverse piece and by means of the two endless chains *d* is carried up the incline *e* and along the upper track *f*. After the lower end of the tube has passed through the cleaning arrangement it falls on the cleaning grate *g*, and automatically cleans itself by striking against the bars of the grate, so that all the excess spelter on the inside of the tube falls down and collects in the space *h* underneath the grate.

After the tube has reached the end of the grate it comes on to the inclined bench *l*. The position of this bench when at rest is horizontal, slightly higher than the water bosh *m*. (See end view.) The falling of the bench to the inclined position is brought about by the wire cable *n*. This is fastened to the traveling piece *o*, which is carried along the upper track by the tongs (holding the tube) to the automatic release *p*. The moment the tongs are opened the bench *l* carrying the tube takes its original horizontal position. By means of levers, the bench is inclined and the tube rolls of itself into the water bosh *m*. It is raised from here by the revolving shaft *q* with its star-like arms *r*, and rolls down the skids into a car, properly galvanized and cooled. The tongs and cross piece fall down the incline *s* on a traveling belt *t*, and are carried back to the starting place, where a new tube is taken, gripped and started on its way by hand.

As compared with hand galvanizing, the apparatus has shown a saving in wages of 33 1/3 per cent. and in spelter of 0.8 per cent. of the total weight of tubes to be treated. Under German conditions this amounts to $1.48 per metric ton of finished tubes. A special crane for holding and agitating the tubes during pickling is also briefly described, which has proved very successful. G. B. W.

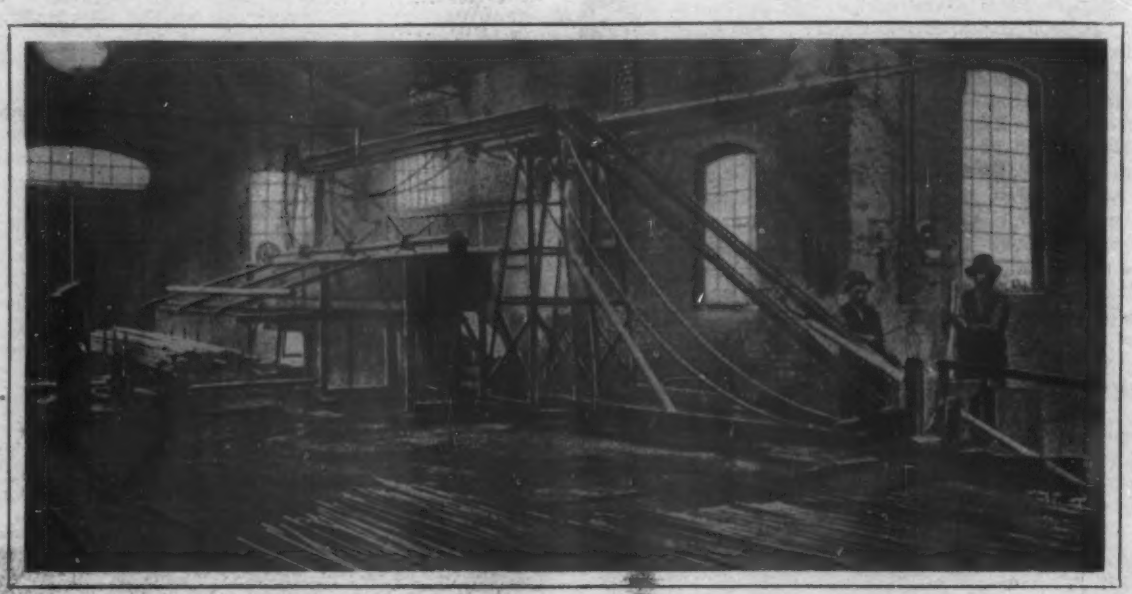


Fig. 1.—Arrangement for Galvanizing Tubes at Laurahütte, Upper Silesia

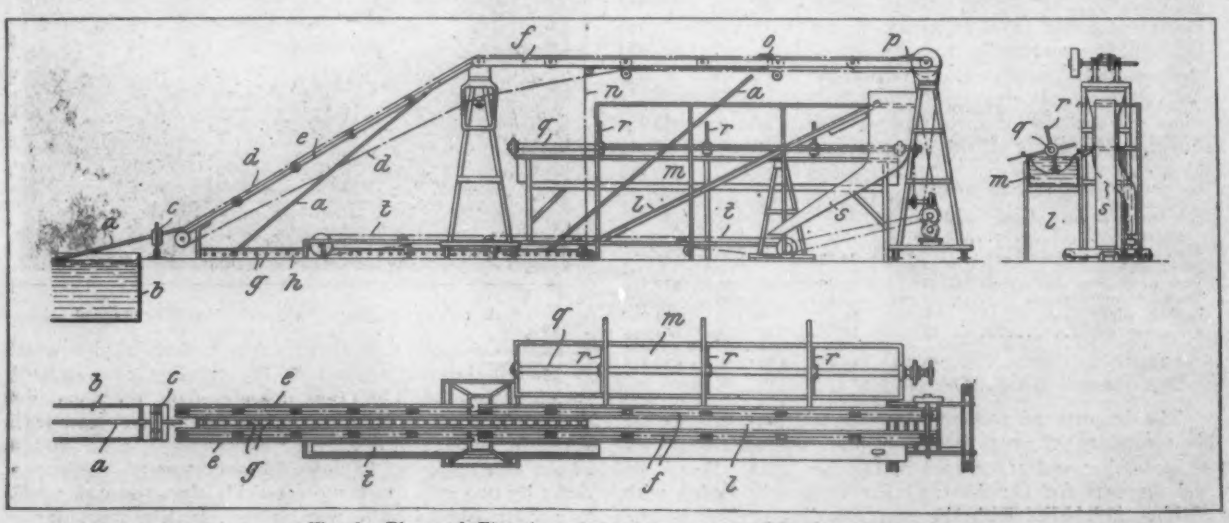


Fig. 2.—Plan and Elevation of Arrangement for Galvanizing Tubes

---

The National Iron & Steel Company, Houston, Texas, has established offices in St. Louis at 1034-1035 Pierce building. The company handles new and relaying rails, track accessories, railroad equipment and raw and finished iron and steel products. I. H. Cohn, vice-president and general manager, will have charge of the St. Louis offices, assisted by W. L. Wilson.

A type of condenser applicable especially to steam turbines and shortly to be brought out, according to A. H. Helander, William Tod Company, Youngstown, Pa., in an address before the Engineers' Society of Western Pennsylvania, is to use a preliminary vessel in which the air is taken out at low vacuum. The air contained in the cooling water after having passed through the preliminary condensing vessel is removed from the main condensing vessel together with the air carried in by the exhaust steam.

A Large Mesaba Range Mine

The Bennett, with Nearly 20,000,000 Tons —Hill Leaseholds of the Second Class

DULUTH, MINN., December 21, 1912.—A very important new operation on the Mesaba is that of the Kewatin Mining Company at its Bennett mine in Itasca county. This company is composed of the Bennett & Longyear interests, which were a part of the Great Northern lease to the United States Steel Corporation, entering that deal under the name of the Sargent Land Company. The fee owners of the lands covered by the Sargent Land Company were to receive, under the Great Northern lease, the same gross royalties as were to be paid to the Great Northern; that is, 85c. for 1907 with 4 per cent. simple interest added annually. In other words, the Great Northern did not benefit from these lands other than in the matter of rail freights, and the Hill ore trust not at all. They were what are called by the Great Northern trustees "leaseholds of the second class."

By agreement with the Great Northern trustees the Sargent Land Company was to have an annually increasing minimum of ore taken from its lands until in 1917 this minimum should have reached 1,270,500 tons, at which amount it was to remain stationary until the exhaustion of the tracts. For 1913 the minimum is 808,500 tons, and the standard royalty is $1.054 a ton. Some arrangement is said to have been made between the Great Northern trustees and the Sargent Land Company, by which, in order that the carrying charges of the latter can be met by operation, the former has now released the tract on which the Bennett mine is to be located, for operation by the owners. Whether or not this means the ultimate abandonment of all these Sargent lands, as well as others that are in the class of leaseholds of the second class, from which the Great Northern trust receives no benefit, is not known, but this is considered probable.

These various leaseholds contain about one-third of all the ore that was leased to the Steel Corporation by the Great Northern trustees; in other words, a trifle more than 100,000,000 tons, of which the greater part is held by the Sargent Land Company and closely allied interests. From these considerations the present operation of the Sargent Land Company derives special importance, although it is a very considerable deal on account of the large tonnage of this one mine and from the fact that this will be available for the general ore market.

This Bennett mine is supposed to contain not far from 20,000,000 tons of ore, mostly good. It is situated in the neighborhood of the St. Paul, operated by Corrigan, McKinney & Co., a Mahoning 80 not yet opened, and the Mesaba Chief, a state property in the Great Northern leasehold. It is at the village of Kewatin and about six miles west of Hibbing. A contract for the stripping of a portion of the tract has been let to the firm of Butler Bros., who have begun work. This contract calls for the removal of the overburden from a portion of an 80-acre tract and calls for 1,700,000 yards of material. But a large part of the ore body is so deeply covered by overburden that it must be mined underground, and the Kewatin company is sinking a vertical three-compartment shaft to a depth of about 300 ft. When the stripping contract is completed and this shaft is down a very large annual tonnage will be available from this mine.

The Longyear & Bennett interests are active in other parts of the Lake Superior region, and are opening a large body of ore in the Marquette region by underground methods. They have also a very large tonnage developed by drills in T 58-15, Mesaba range, and ready for opening as soon as the water problem is satisfactorily adjusted and there is need of the ore. It is probable that these interests in time will become a preponderating factor in the merchant ore market of the Lake Superior region.

Tod-Stambaugh Company on the Cuyuna Range

The Tod-Stambaugh Company, operator of the Biwabik mine, Mesaba range, has leased a tract of Cuyuna range land, in section 10-46-29, from the Whitmarsh Iron Company, and expects to begin developments immediately. The property will be stripped, and shipments are to be made the coming year if possible. This is the second stripping operation on the Cuyuna, the other being that of Messrs. Carlson, Williams and others, of Duluth, who are hydraulicking an ore deposit situated on the shores of Little Rabbit lake, west of the village of Crosby. At this work there is not sufficient fall to carry off by gravity the material dislodged by the giant, so a sump is being created and a sand pump is to be installed in order to lift the earth to a level that will carry it to the lake. The ore body here is several hundred feet wide, mostly of ore under 50 per cent., and it is now hoped to start in on a jig concentration process that will bring this limonitic ore to a merchantable grade. In addition to this lean ore there is a very considerable tonnage of ore better than 50 per cent., which will be shipped direct. On this property one hole has been sunk more than 700 ft., showing about 65 ft. of surface, and the remainder lean ore, with the hole bottomed in the same material. The average of this hole will probably run about 40 per cent., but there are but 5 ft. of the entire depth that show better than 50 per cent. In addition, there are several holes showing very good depths of ore averaging, say, 55 per cent.

Starrett Employees Appreciated

The L. S. Starrett Company, Athol, Mass., issued the following circular to its employees under date of December 20:

"The past year has been one of prosperity and progress. The gradual and steady increase in our sales is gratifying, but not less significant and encouraging is the manifest improvement in conditions inside the factory. Our employees have shown that they appreciate more than ever before the fact that their interests and the company's are identical; that quality in our product is the chief thing —the indispensable thing—and that next are efficiency and loyalty on the part of our co-workers.

"When a man gets over the idea that he is paid for simply putting in so many hours a day and turning out just enough work to get by, and puts intelligent, interested effort into what he does, and even gets a bit enthusiastic over finding a way to improve the quality or increase the amount of his production, his value to the company is largely increased and he is in a way of making much more of a man of himself. We want men, not human machines; not time alone, but brains. A man who is worth $20 a week takes up no more room than one who is hardly worth $10. We are glad to repay increased efficiency by increased wages. We have made many increases in pay during the year for this reason.

"We feel, however, that the increase in efficiency due to intelligent and interested industry in our plant the past year has been so general and has been such an important factor in the healthy growth of our business, that we may well make some special recognition of it at this time. It was therefore voted by our directors at a meeting held December 11, to pay, as soon after January 1, 1913, as practicable, to each person in the employ of the company on that date, a sum equal to 2 per cent. of the entire amount of wages paid to such employee in the year 1912."

Testing Rack for Sprinkler Heads

In the plant of the Globe Automatic Sprinkler Company, Cincinnati, Ohio, is a testing rack designed by the company's engineers for determining the tensile strength of sprinkler heads. The solder from which the links are made must melt at 160 deg. F, and at the same time must have considerable tensile strength in order to withstand any reasonable water pressure. The apparatus is arranged to test 26 heads at a time. A link from each lot is sent to the testing room and is subjected to a pulling strain of 200 lb. for a period of 48 hours. Its lot number is indicated by a card which accompanies it. Should the link break in testing, an electric alarm is sounded and the foreman, or, at night, the watchman, makes a record of the time. If more than two links prove defective, the entire lot is discarded.

The Rateau Steam Regenerator Company, 140 Cedar street, New York, has been awarded a contract by the Carnegie Steel Company for a complete Ratcau patent steam regenerator equipment for the Homestead steel works, Munhall, Pa. The regenerators are to regulate the exhaust of a plate mill delivering steam intermittently at the rate of 260,000 lb. an hour, and will supply a steady flow of exhaust steam to a mixed pressure turbine of 3750 kw.

ESTABLISHED 1855

THE IRON AGE

Published Every Thursday by the

David Williams Company

239 West 39th Street New York

W. H. Taylor - *President and Treasurer*
I. A. Mekeel - - - *First Vice-President*
Frits J. Frank - - - - - *Secretary*
M. C. Robbins - - - *General Manager*

Editors

Geo. W. Cope A. I. Findley W. W. Macon

Charles S. Baur - - *Advertising Manager*

Branch Offices

Chicago: Otis Building Philadelphia: Real Estate Trust Bldg.
Pittsburgh: Park Building Cleveland: American Trust Building
Boston: Compton Building Cincinnati: Mercantile Library Bldg.

Entered at the New York Post Office as Second-class Mail Matter

Subscription price: United States and Mexico, $5.00 per year; to Canada, $7.50 per year; to other foreign countries, $10.00 per year.

CONTENTS.

An Example of Low Cost Gas Engine Power 1477
Analysis of the Ball Bearing 1478
A New Regenerative Continuous Heating Furnace 1478
An Electrical Lift Bridge 1479
A Motor Driven Grinding Machine 1479
Design of an Open-Hearth Foundry Furnace 1480
Steel Products in the Package Field 1483
The World's Largest Cable Tested 1483
The Case of the Oil Engine 1484
Reversing Electric Motor Machine Drives 1486
October Iron and Steel Exports and Imports 1487
A Lifting Magnet for Storing Iron Pipe 1487
The Automatic Galvanizing of Tubes 1488
Starrett Employees Appreciated 1489
Testing Rack for Sprinkler Heads 1489
A Large Mesaba Range Mine 1489
The Commission on Industrial Relations 1490
Our Expanding Export Trade 1491
Our Trade with Russia 1491
Correspondence 1492
Worcester Pressed Steel Extensions 1492
Deep Well Power Working Head 1492
The German Iron and Steel Association 1492
Case Carbonizing of Steel 1493
The Iron and Metal Markets 1494
Personal 1505
Pittsburgh and Vicinity Business Notes 1505
A New Safety Set Screw 1505
Experimenting with Open Hearth Regenerators 1506
Statistical Inquiry in the Steel Dissolution Suit 1510
Machine Tool Exhibit at Automobile Show 1511
Alabama Consolidated Coal & Iron Company 1511
No Government Inspection of Steel Rails 1512
Decision on Eastern Iron Ore Freight Rates 1513
Chrome-Vanadium Steel Tires 1513
A Pocket Micrometer Case 1513
Machine Shop Developments in Ten Years 1514
Prizes for Papers on Welding 1517
The Machinery Markets 1518
Trade Publications 1524
A Calculating Circle 1524
Customs Decisions 1525
Judicial Decisions of Interest to Manufacturers 1526

The Commission on Industrial Relations

President Taft's appointments to the new Commission on Industrial Relations, which have already been announced in these columns, came almost exactly one year after a group of university men and sociologists who were attending an economic and sociological congress in Washington called on him to urge the creation of such a commission. The labor unions are probably satisfied with their representation, since President Taft named the three men whom the American Federation of Labor favored. The three representatives of employing interests—President Delano of the Wabash, Adolph Lewisohn of New York and Ferd C. Schwedtman of the Wagner Electric Company, St. Louis—are entirely competent, and their appointment will probably not evoke criticism from manufacturers. Not so much can be said, however, of the three appointees, who are presumed to represent the whole nation apart from labor union members and employers of labor, though the activity of United States Senator Sutherland in formulating a workmen's compensation and employers' liability bill made his selection at least a natural one.

Sociologists who were particularly active in agitating for the commission are not at all pleased with it. At a meeting held in New York a few days ago resolutions were passed expressing their dissatisfaction on the grounds: first, that no woman has been named as a member of the commission, although there are now more than 6,000,000 women wage earners in the United States; second, that no well-known economist or social worker has been appointed, and, third, that the commission lacks men of such public prominence as to give assurance "that the enlightened public interest, which is the chief interest at stake in this most important task, will be adequately represented."

In the address presented to President Taft one year ago it was set forth that the slowness with which the legislative proposals of labor unions are enacted into laws constitutes the "dead center of the social machinery." This was contrasted with "the speed at which it acts to prevent picketing and rioting during strikes." The President was told that "the criminal court is not a sufficient instrument through which democracy can address itself to the economic struggle," though just what was meant by this was not made clear. The burden most heavily on the minds of the social workers when they saw the President was the Los Angeles dynamiting, and the McNamara case was treated as though it were a crisis to call a nation to action. We have heretofore commented on this phase of the matter to the effect that the McNamara murders must by no means be regarded as symptomatic of any labor crisis. We have no patience with the disposition of some writers to make it appear that "society" has brought about conditions which provoke labor outbreaks and therefore is in a way responsible for the acts of such criminals as have been dynamiting throughout the country. Moreover, the last session of Congress did not bear out the contention of the agitators for an industrial commission, that legislative proposals of labor unions are hard to enact into law. Employers have quite a different idea of the achievements of that session in labor legislation.

In the practical outcome of commissions, such as the one just appointed, much depends on the degree of public confidence in the ability and worth of the investigators. The Commission on Industrial Relations

has been given great power. It is authorized to send for persons and papers, to administer oaths, to summon and compel the attendance of witnesses and to compel testimony. The purpose of the framers of the act was evidently to give greater publicity to all facts and conditions bearing on the relations of employers and employees than has been done in any previous inquiry, and to get closer than has yet been possible to the underlying causes of dissatisfaction in the industrial situation. Whether the commission as constituted will be able to do this is a matter for the future to determine. As indicating the political hold of organized labor is the fact that one-third of the commission, as required by the act, is chosen from the small fraction of the labor of the country that belongs to unions, while there is not a single representative of the vast body of the country's wage earners that is outside of unions.

Our Expanding Export Trade

In the recent political campaign much was heard regarding the restriction of our international trade by the tariff. Our manufacturers were represented as struggling to free themselves from bonds which prevented them from extending their foreign trade. Statements of this kind were made just at the time when our export trade in all kinds of products was increasing by leaps and bounds.

A most emphatic refutation of such assertions has just appeared in the official statement for the month of November by the Division of Statistics of the Bureau of Foreign and Domestic Commerce of the Department of Commerce and Labor. This statement shows that the month was a record breaker in merchandise exports, which attained a total value of $277,898,681, being much in excess of any previous month in the history of the United States. The imports reached a total value of $153,134,995, which, while heavy, was somewhat exceeded in each of five previous months, all in the current calendar year. The excess of the value of exports over imports of merchandise was $124,763,686, thus showing most unmistakably that the export trade was by no means hampered in its development by our fiscal laws. If there was any hampering, it was due entirely to inability to secure vessel room sufficient to carry the tremendous quantity of our merchandise seeking transportation to foreign countries.

Details have not yet been published showing the proportion of manufactures to other commodities in our November exports, but the same bureau reports that over 50 per cent. of our exports in the ten months ended with October were products of the factories of the United States. It is therefore safe to presume that this proportion was maintained in November. It is also important to bear in mind that in the ten months ended with October, according to the same authority, 52 per cent. of the merchandise imported was for use in our factories. The exports of iron and steel figured largely in swelling that volume of exports. The value of exports of iron and steel and manufactures thereof, excluding iron ore, in October was $25,273,059, which was almost 10 per cent. of the total value of the month's exports of merchandise. The value of iron and steel exports for the ten months ended with October was $238,972,631, against $199,209,431 in the corresponding period of the previous year and $158,478,345 in the same period in 1910. The bureau does not give the total weight of the exports of iron and steel, but only gives such figures for certain manufactured forms. Taking these figures as printed, it is found that such exports in October totaled 250,746 gross tons. This is a magnificent showing. Quite a number of vessels of fairly large size would be required to transport such a quantity as here stated. The total exports of these special commodities in the ten months ended with October were 2,327,676 gross tons. These figures demonstrate that our foreign trade is far from being throttled by the existing tariff.

In this connection it is interesting to note that our tin plate manufacturers are continuing the capture of foreign trade which began to attract attention last year. The imports of tin plates in October were only 282 gross tons, while the exports were 5696 tons. In the ten months ended with October the imports totaled only 1784 tons, while the exports were 72,519 tons, or over 50 per cent. more than in the corresponding period of the previous year. This branch of our iron and steel industry is the youngest on the list, but is making itself felt vigorously in the export trade.

Our Trade with Russia

American exporters of machinery are greatly disturbed because of the uncertainty regarding our relations with Russia after the close of the present month. At that time our treaty with Russia expires in accordance with the proclamation of abrogation issued by the President of the United States early in the present year. The Department of State has been appealed to for a specific assurance with regard to the imposition of Russian duties on American products after January 1, but so far it appears to be unable to render our manufacturers any assistance.

We are advised that American manufacturers have Russian orders on hand at the present time for considerable machinery, some being for special tools, and these manufacturers are consequently exceedingly anxious to know what action they shall take. Their representatives in Russia, who have been diligently building up a trade in American machinery and have been enabled to send their principals important orders, are worrying over the situation, as their Russian customers are as much in the dark as our manufacturers as to whether they will be able to get the machines they have ordered and of which they are doubtless in need.

The exports of American machinery to Russia have been steadily increasing in recent years. A prominent American manufacturer states that in an extended trip through that country in 1911 he found public sentiment had considerably grown in favor of American products and for this reason he, as well as numerous other American manufacturers, made large expenditures for the purpose of getting a foothold for his trade in that country. Every hope had been entertained that long before the date set for the expiration of the old treaty should have arrived a new treaty would have been agreed upon by the representatives of Russia and the United States. It now seems that the elaborate work done in building up this trade and the heavy outlay incurred in educating the Russian buyers of machinery to appreciate American ideas will be completely nullified if some kind of working agreement between the two countries is not brought about by which commodities can be exchanged between them until a formal treaty shall have been agreed upon.

It would be well for all manufacturers having relations with Russia to appeal by letter and by telegraph to the President and the Secretary of State urging them to bring about some understanding with Russia at once so that our important trade with that country may not be abruptly cut off with the close of this month.

Correspondence

The Geological Survey's Cuban Iron Ore Statistics of 1911

To the Editor:—In my letter to *The Iron Age* concerning iron ore and pig iron statistics, which was published in your issue of December 19, I stated that the question as to the disagreement between imports and shipments of iron ore from Cuba to the United States had been referred to the principal producer, the Spanish-American Iron Company. A reply was received from Charles F. Rand, president of this company, a few hours too late to permit of the information being printed in your issue of December 19.

You will no doubt be interested to know that your surmise was practically correct with regard to the discrepancy in figures reported to the Survey. The raw ore shipped from the mines to the docks, as well as stocks of ore, both in natural and nodulized condition, had been reported to the Survey as included in shipments to the United States. The recent letter from Mr. Rand shows that a total of 640,508 gross tons of ore, both natural and nodulized, was actually shipped to the United States by the Spanish-American Iron Company, instead of 1,216,520 tons, as formerly reported by that company. The total shipments of iron ore from Cuba are, according to these revised figures, 1,163,714 gross tons, which check within 73 tons of the figures given by the American Iron and Steel Association, and also check fairly closely with the imports as reported by the Bureau of Statistics. These revised figures have been received in ample time to be included in the Survey's volume of Mineral Resources for 1911.

A further statement of your comment reads as follows: "We consider this discrepancy to be typical of the error and confusion sure to result from the attempt to make shipments, or marketed production, the gauge of the iron mining industry rather than ore mined." I am not so sure that you have hit the nail on the head. The *shipments* of iron ore from Cuba are just what the American Iron and Steel Association, as well as the Survey, aims to collect and publish, rather than the quantity of ore mined in that country.

E. F. BURCHARD, Geologist.

WASHINGTON, D. C., December 23, 1912.

The Worcester Pressed Steel Company's Extensions

The Worcester Pressed Steel Company, Worcester, Mass., is making large additions to its plant and has plans for further extensions in 1913 and for a still greater development of its producing capacity in the more distant future. Eight acres of land adjoining the present property on the south has just been purchased, making a total area of 14 acres. The new portion will be served by an additional spur track from the Boston & Maine Railroad and will be used probably for rolling mills and press shops when other available area has been exhausted.

A pickle house, 69 x 108 ft., has just been completed and its equipment installed, including a Maris electric traveling crane covering 6 pickle tanks, 22 ft. long x 3 ft. 9½ in. wide and 27½ ft. deep for bars, and a Morgan steam grasshopper crane covering 6 pickle tanks 4 ft. in diameter and 6 ft. deep for coils. The roof extends upward in two large ventilators 40 ft. high. A spur track enters the building, the ground floor being level with that of the car. Between this building and the present factory the company proposes to build in the spring a mill for cold rolling steel, 90 x 150 ft., one story, of monitor construction. It will be fireproof throughout, of steel metal sash and glass. The present two stands of cold rolled mill will be moved into this building and several times as much new equipment added for which the company will be in the market next summer or fall. All equipment will be operated electrically by individual motors and lighted from the Connecticut River power wires for which the plant has transformers of 600 h.p. capacity.

The annealing house will be extended by a structure 30 x 126 ft. one story, with monitor ventilated roof. The foundation of this building is already completed. An extension of the present shop of the tool-making department is under erection, 90 x 90 ft., two stories. It is also of steel, metal sash and glass. The contract for the structural steel for this building and that of the proposed rolling mill will be let this winter. The extension of the press shop department is the beginning of a new series of three buildings, 90 x 260 ft. The center bay will be open to the roof and covered by a monitor of truss construction having windows operated by rack and pinion opening device. The bay will be served by 5-ton cranes. These buildings will run parallel to the extensions of the annealing house which will be required in the same proportion to take care of the additional present equipment. The addition will be equipped with a fireproof die storage vault having steel shelving, a testing laboratory for which an Olsen 100,000-lb. tensile testing machine and a new type Olsen endurance testing machine have just been received; a drafting and tool designing department, works manager's and superintendent's offices, help application bureau, etc. The remainder of the series will probably not be built before 1914.

Deep Well Power Working Head

The Goulds Mfg. Company, Seneca Falls, N. Y., has brought out a new power working head which has been developed for use in connection with pneumatic pressure water supply systems. The practice has been to use a separate pump for furnishing air pressure to the tank when deep well working heads of this class were used to supply water. In the new pump the head is built with the air cylinder so that both the air and water are pumped to the tank. The air cylinder is mounted on the frame near the top, its plunger being operated by a rod which is connected to the pitman of the working head by an extension of the pin connecting the pitman to its rod. A pipe from the air cylinder connects it with the discharge of the working head and contains a check valve and the necessary couplings. A cock is provided so that the air will not go to the tank when it is open and the outfit is relieved of this pressure when it is not needed. The air cylinder, suction valve and discharge valve are made of brass and the plunger is leather cupped packed.

The working head is strong and substantial, the entire frame being cast in one piece. The gear and pinion are of charcoal iron, machine cut from the solid metal. The main and pinion shafts run in large babbitted bearings.

The German Iron and Steel Association

Our Berlin correspondent writes as follows: "The Verein Deutscher Eisenhüttenleute held its general meeting at Düsseldorf several days ago with an unusually large attendance. The chairman, Dr. Springorum, reported that the membership of the society has now risen to 5400. He called attention to the big increase in Germany's pig iron production this year and said that the October make was at the rate of 19,000,000 tons a year. The proposal to introduce legislation to establish the 8-hour work-day in industrial concerns called forth the remark from one speaker that this would necessitate the employment of 80,000 additional laborers in the iron trade, and he denied that this number could be found, either at home or abroad."

The Dain Mfg. Company, Ottumwa, Iowa, which recently equipped its farm implement factory electrically, with an installation of about 300 hp., is adding another 100 hp. It obtains current from the Ottumwa Railway & Light Company, and will shortly discontinue the use of steam power completely.

Commercial Case Carbonizing of Steel

Important Information Obtained from Exhaustive Experiments Under Varying Treatment —Influence of Various Carbonizing Agents

A paper by Marcus T. Lothrop, Canton, Ohio, read before the American Society of Mechanical Engineers at the recent meeting, contains much valuable information on case carbonizing, based upon a series of exhaustive experiments. In introducing the results of his work, Mr. Lothrop explained the case carbonizing requires that the carbon content of the material on the surface be increased while the original composition of the material in the interior is retained. The operation requires that the user, in a sense, make his own steel and the details of the operation must be understood to the end that the operation may be conducted with the minimum cost and with the maximum certainty and that variations and irregularities shall not creep into the product.

The investigations indicate that, commercially, the case carbonizing operation can be performed in such a manner that the final result will be absolutely uniform and that the advantages which accrue represent the most efficient manner of obtaining the desired physical properties in many constructions. It was with the object of pointing out the causes of and the results effected by irregularity and the means and precautions which must be employed to produce uniformity, that these researches were undertaken.

The Effect of Heat Treatment

The first of the experiments was made in order to determine the effect of heat treatment in case carbonizing. The materials used ran from 0.15 per cent. to 0.25 per cent. carbon, basic open hearth; 0.10 per cent. to 0.31 per cent., Halcomb electric furnace nickel steel; 0.20 per cent. and 0.49 per cent., Halcomb electric furnace chrome-vanadium steel, and 0.50 per cent., Halcomb electric furnace chrome-nickel steel. The conclusions from these tests follow: Strength and toughness decrease with increasing depth of case. This is important commercially for with a certain steel and a certain heat treatment uniformity of strength and toughness is impossible if the depth of case varies.

The critical depth of case at which maximum brittleness and minimum strength occur depends upon the initial carbon content of the steel which is case carbonized. The higher the original content, the smaller the ratio of depth of case to diameter of core at the point where this brittleness occurs. The commercial importance of this point is that the manufacturer using the steel for case carbonizing should know its composition and should vary the depth of the carbonizing effect as demanded by the composition of the metal being used.

Strength and toughness increase with double heat treatment. This result is to be expected, for the dual nature of case carbonized steel requires two thermal treatments properly to refine the composite metal. Strength and toughness increase when the temper is drawn at 380 deg. Fahr. This operation does not decrease the hardness but relieves in a greater or less degree the strains set up in hardening and makes for uniformity as well as more pronounced physical properties.

Annealing after case carbonizing is a doubtful operation. The physical improvement with single heat treatment may be obtained by resorting to double heat treatment, for the results will be better and the time consumed in the operation much shorter. Annealing does not improve the double heat treated pieces and may even cause loss of strength and toughness, due to the decarbonization which may take place. Annealing is not to be recommended.

The case-carbonized steel will, with either double or single heat treatment, become file hard at temperatures too low for the best development of the maximum strength and toughness. Although seemingly paradoxical, the dual nature of the steel after case carbonizing will explain this established fact, when one recalls that the transformations of the exterior are first completed at low temperatures, and that those of the interior are last completed at higher temperatures.

All steels lose their file hardness when drawn at 425 deg. Fahr., save chrome vanadium which loses it at 450 deg. Fahr.

The ideal heat treatment for a case carbonized steel may be assumed to be: Case carbonize to the thinnest possible depth of case demanded by the conditions of service; reheat for the core; quench in a suitable fluid; reheat for the case; quench in a suitable fluid; draw the temper as far as the conditions of service will permit.

Case-carbonized steel parts, such as gears, etc., may be stronger, tougher and harder than similar parts made from oil-hardened steels.

A microscopic experiment on the effect of heat treatment after case carbonizing was to determine, if possible, the constitutional difference between a case-carbonized bar of steel which had received a single heat treatment, and a piece of the same metal carbonized in the same manner which had received a double heat treatment, the first reheating designed to be the best possible for the interior of the core and the second reheating designed to be the best possible for the case or carbonized zone. The results indicate that the double heat treatment increases the strength and toughness of case-carbonized steel due to the smaller and finer martensitic structure developed.

Temperature in Case Hardening

The object of another experiment was to determine the lowest temperature at which case carbonizing begins; the lowest temperature with each of the three different types of case-carbonizing steels (straight carbon and alloy are of the same carbon content) at which it might be most efficiently conducted in practice; and the best temperature for the case carbonizing of steel.

The following is a general summary of conclusions of temperature in case carbonizing:

The depth of case carbonizing effect in a given time increases with the temperature.

The carbon content in the case-carbonized zone in a given time increases with the temperature. This affords the commercial opportunity of varying the depth of case-carbonizing effect as desired by changing the time, and of varying the carbon content of the case-carbonized zone by changing the case-carbonizing temperature. It is poor practice to raise the temperature of the case-carbonizing operation for the purpose of reducing the time which the operation consumes, for this will increase the maximum carbon content of the case-carbonized zone and may change the character of the physical properties of the finished product.

The minimum temperature at which uniform penetration of carbon can be obtained with case carbonizing seems to be 1500 deg. Fahr. With lower temperatures the carbon maximum is not uniform in its distribution and the penetration too slow.

The presence of excess cementite in the form of needles within the pearlite grains, so conspicuous in nickel and carbon steels, indicates a temperature during case carbonizing which overheats the metal being so treated.

Nickel and Chrome Vanadium

Nickel steel gives the greatest total penetration and greatest gradation zones.

Chrome vanadium gives the highest carbon maximum and finest grained steel.

When case carbonizing is conducted at 1400 deg. Fahr. or lower, the carbon maximum does not exceed the eutectic. As the case-carbonizing temperature increases, a zone of hypereutectic composition develops which increases in depth with the temperature. The depth of this zone becomes important when sufficient warpage takes place in the piece being hardened to demand grinding after the final heat treatment. It has been demonstrated often that a carbon content of more than 1 per cent. in the surface of a case-

(Continued on page 1511)

The Iron and Metal Markets

Many Signs of Strength

Unexpected Activity in Iron and Steel

Large Sales of Billets—Foundries Busier Under Railroad Demand

Impressive signs of strength and of continuing prosperity in the iron and steel trades have appeared at a time when there was some disposition to look for a lull. Especially significant have been an inquiry of the Harriman lines for 12,000 cars—a climax to a wonderful year of car buying—and heavy purchases of steel billets in both eastern and western Pennsylvania.

It is estimated that 30,000 tons of billets, chiefly for rolling, were bought in Philadelphia, including 15,000 tons of Southern steel. At Pittsburgh the leading producer has again gone into the market for billets, and one lot of 15,000 tons of open hearth was taken at close to $29. In eastern Pennsylvania rolling billets have sold at $32 and forging billets at $36.

The renewed activity in railroad equipment and in various forms of material for railroads has been a surprise even to those in the trade who have been making large predictions for next year. A most unusual feature is the placing this month of contracts for girder rails, which have always heretofore awaited the coming of spring. At Pittsburgh 7000 tons of new orders and specifications for light rails were entered in the past week by one company, making it the largest week of the year in that line.

A considerable rail order was placed recently, of which details have not been given out. A 5000-ton lot of Bessemer rails for the Nickel Plate road was taken by the Lackawanna Steel Company. Export business includes 10,000 tons of Bessemer rails for the Buenos Aires & Pacific, which will be rolled in August and September. Active specifying for track fastenings has been a feature in the domestic trade.

The extent to which the mills are sold into 1913 on billets, rails, bars, plates and shapes compelled some slowing down in new orders in December, but present indications are that the Steel Corporation's unfilled orders on December 31 will be close to the total at the opening of the month. In the case of most if not all the independent companies shipments have been more than new orders in December.

In the Central West there has been considerable selling of bars, plates and shapes in the past week for delivery in the second half of 1913 at 1.40c., Pittsburgh, for bars and 1.50c. for plates and structural steel. The structural outlook at Chicago is particularly good. For work pending there, including two Marshall Field estate buildings, the Morrison hotel and the Stevens store, 28,000 tons will be required.

Eastern plate mills find no let-up in the demand upon them; in one case it showed an increase in the past week and some plates for export were sold at 1.75c. at eastern Pennsylvania mill. Car works requirements, if all the 60,000 cars now in the market are ordered, will put a heavy strain on the unoccupied plate capacity for 1913 west of the Alleghenies.

Pipe and tube mills have had their largest year's business and close the year with a record total of unfilled orders.

It is beginning to be appreciated that steel supply may not be sufficient to permit full operation of sheet and tin plate plants in the first quarter of 1913. Sheet prices have tightened in consequence and $2 to $3 a ton more than the common basis has been paid in some cases. Tin plate business has been heavier than was expected at this season, pointing to extraordinary activity in the canning industry next year.

Pig iron is quiet at Pittsburgh, but pipe works have been active buyers in the East and there is good inquiry at Chicago. Three pipe companies have taken a total of about 25,000 tons in the Philadelphia market. An inquiry for 2500 to 5000 tons of charcoal iron for car wheels has come up at Chicago and some early buying by malleable foundries is expected. Chicago reports also that foundries, especially those doing railroad work, are finding a larger demand on their capacity than they had anticipated. A rather surprising situation has developed at Buffalo also, some foundries being so busy that they have postponed their inventories.

Southern furnaces are maintaining a $14 minimum for No. 2 foundry iron at Birmingham, and the small amount of resale iron offered at less is not of a kind to make it sought. There is further inquiry for Southern iron for Italy. In Alabama the largest producer has blown in one more furnace and another, long inactive, may be started.

The coke problem has been made more serious by the coming of real winter. Transportation troubles for all shippers have been aggravated, even under the remarkable weather conditions of many weeks; a heavy snowfall threatens derangement of the whole industry.

The lake vesselmen have established a 5c. advance in ore carrying charges for 1913 and it was not contested, this year's rate being profitless. An advance not relished by ore shippers is a new charge of 5c. a ton for loading fixed by the ore railroads at Escanaba.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics.

At date, one week, one month and one year previous.

	Dec. 24, 1912.	Dec. 18, 1912.	Nov. 27, 1912.	Dec. 27, 1911.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia.	$18.50	$18.50	$18.50	$14.85
Foundry No. 2, Valley furnace..	17.50	17.50	17.00	13.00
Foundry No. 2, S'th'n, Cin'ti...	17.25	17.25	17.25	13.25
Foundry No. 2, Birmingham, Ala.	14.00	14.00	14.00	10.00
Foundry No. 2, furnace, Chicago*	18.00	18.00	18.00	14.00
Basic, delivered, eastern Pa....	18.25	18.25	18.25	14.25
Basic, Valley furnace	16.50	16.50	16.50	12.25
Bessemer, Pittsburgh	18.15	18.15	18.15	15.15
Malleable Bessemer, Chicago*..	18.00	18.00	18.00	14.35
Gray forge, Pittsburgh.....	17.15	17.15	17.15	13.40
Lake Superior charcoal, Chicago	18.75	18.75	18.75	16.00
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh....	27.00	27.00	27.00	20.00
Open hearth billets, Pittsburgh.	**28.50**	27.50	27.00	20.00
Forging billets, Pittsburgh.....	**35.00**	34.00	34.00	26.00
Open hearth billets, Philadelphia	32.00	32.00	32.00	22.40
Wire rods, Pittsburgh	30.00	30.00	30.00	24.50
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	17.25	17.25	18.00	14.75
Iron rails, Philadelphia.....	18.00	18.00	19.00	16.00
Car wheels, Chicago.....	17.00	17.00	17.00	13.25
Car wheels, Philadelphia.....	16.00	16.00	15.00	12.50
Heavy steel scrap, Pittsburgh...	14.75	14.75	14.75	12.50
Heavy steel scrap, Chicago.....	12.50	12.50	13.00	10.50
Heavy steel scrap, Philadelphia.	14.50	14.50	15.50	12.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel, Per Pound to Large Buyers:	Dec. 24, 1912. Cents.	Dec. 18, 1912. Cents.	Nov. 27, 1912. Cents.	Dec. 27, 1911. Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.67½	1.67½	1.67½	1.27½
Iron bars, Pittsburgh	1.70	1.70	1.65	1.25
Iron bars, Chicago	1.57½	1.57½	1.55	1.15
Steel bars, Pittsburgh, future	1.40	1.40	1.40	1.15
Steel bars, Pittsburgh, early	1.70	1.70	1.60	1.15
Steel bars, New York, future	1.56	1.56	1.56	1.31
Steel bars, New York, early	1.86	1.86	1.76	1.31
Tank plates, Pittsburgh, future	**1.50**	1.45	1.45	1.15
Tank plates, Pittsburgh, early	1.75	1.75	1.70	1.15
Tank plates, New York, future	**1.66**	1.61	1.61	1.31
Tank plates, New York, early	1.91	1.91	1.86	1.31
Beams, Pittsburgh, future	**1.50**	1.45	1.45	1.15
Beams, Pittsburgh, early	1.75	1.75	1.75	1.15
Beams, New York, future	**1.66**	1.61	1.61	1.31
Beams, New York, early	1.91	1.91	1.91	1.31
Angles, Pittsburgh, future	**1.50**	1.45	1.45	1.15
Angles, Pittsburgh, early	1.75	1.75	1.75	1.15
Angles, New York, future	**1.66**	1.61	1.61	1.31
Angles, New York, early	1.91	1.91	1.91	1.31
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.15
Skelp, sheared steel, Pittsburgh	1.50	1.50	1.50	1.20
Steel hoops, Pittsburgh	1.50	1.50	1.50	1.25

Sheets, Nails and Wire, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.25	2.25	2.25	1.90
Wire nails, Pittsburgh	1.75	1.75	1.70	1.55
Cut nails, f.o.b. Eastern mills	1.75	1.75	1.75	...
Cut nails, Pittsburgh	1.70	1.70	1.70	1.50
Fence wire, ann'l'd, 0 to 9, P'gh.	1.55	1.55	1.50	1.35
Barb wire, galv., Pittsburgh	2.15	2.15	2.10	1.90

Coke, Connellsville, Per Net Ton, at Oven:				
Furnace coke, prompt shipment	$4.00	$4.00	$3.90	$1.75
Furnace coke, future delivery	3.25	3.25	3.25	1.65
Foundry coke, prompt shipment	4.50	4.50	4.25	1.90
Foundry coke, future delivery	4.00	4.00	3.75	2.15

Metals, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	17.62½	17.62½	17.75	14.25
Electrolytic copper, New York	**17.50**	17.37½	17.62½	14.12½
Spelter, St. Louis	7.15	7.15	7.35	6.20
Spelter, New York	7.30	7.30	7.50	6.35
Lead, St. Louis	4.12½	4.17½	4.35	4.35
Lead, New York	4.27½	4.32½	4.50	4.45
Tin, New York	**50.15**	49.87½	49.55	45.25
Antimony, Hallett, New York	**9.50**	9.37½	9.75	7.60
Tin plate, 100-lb. box, Pittsburgh	$3.60	$3.60	$3.60	$3.40

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.50c. to 1.75c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 2	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive fire box steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inc	.25
Cutting to lengths or diameters under 2 ft., to 1 ft., inc.	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs ¼ in. and over, and zees, 3 in. and over, 1.50c. to 1.75c., extras on other shapes and sizes as follows:

I-beams over 15 in.	.05
H-beams over 18 in.	.05
Angles over 6 in.	.05
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card, Sept. 1, 1909	.05
Tees, 3 in. and up	.05
Angles, channels and tees, under 3 in. plus full Extras as per steel bar card, Sept. 1, 1909	.05
Deck beams and bulb angles	.30
Hand rail tees	.75
Checkered, trough and corrugated floor plates	.90

Extras for Cutting in Length.

	Cents per lb.
Under 3 ft., to 2 ft. inclusive	.25
Under 2 ft., to 1 ft. inclusive	.50
Under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight) in effect from January 1, 1913; iron pipe (full weight), from October 21, 1912:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	67	48
½	77	66½	⅜	66	47
¾ to 3	80	71½	½	70	57
			¾ to 2½	73	62

Lap Weld.

2	77	68½	1¼	57	46
2½ to 6	79	70½	1½	68	57
7 to 12	76	65½	2	69	59
13 to 15	53	..	2½ to 4	71	62
			4½ to 6	71	63
			7 to 12	69	56

Plugged and Reamed.

1 to 3, butt	78	69½	1 to 1½, butt	71	60
2, lap	75	66½	2, butt	72	61
2½ to 4, lap	77	68½	1¼, lap	55	44
			1½, lap	66	55
			2, lap	67	57
			2½ to 4, lap	69	60

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜	68	57½	⅛	64	53
½	73	66½	¼	68	61
¾ to 1½	77	70½	⅜ to 1½	72	63
2 to 3	78	71½	2 and 2½	73	64

Lap Weld, extra strong, plain ends.

2	74	65½	1½	66	60
2½ to 4	76	67½	2	67	59
4½ to 6	75	66½	2½ to 4	71	62
7 to 8	68	57½	4½ to 6	70	61
9 to 12	63	52½	7 and 8	64	54
			9 to 12	59	48

Butt Weld, double extra strong, plain ends.

½	63	56½	¼	58	50
¾ to 1½	66	59½	⅜ to 1½	61	53
2 to 2½	68	61½	2 to 2½	63	55

Lap Weld, double extra strong, plain ends.

2	64	57½	2	56	50
2½ to 4	66	59½	2½ to 4	61	55
4½ to 6	65	58½	4½ to 6	60	54
7 to 8	58	47½	7 to 8	53	43

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $30. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.55; galvanized, $1.95. Galvanized barb wire, to jobbers, $2.15; painted, $1.75. Wire nails to jobbers, $1.75.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

	Plain Wire, per 100 lb.							
Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.70	$1.75	$1.80	$1.85	$1.95	$2.05	$2.15	$2.25
Galvanized	2.10	2.15	2.20	2.25	2.35	2.45	2.85	2.95

Boiler Tubes.—Discounts on lap welded steel, in effect from January 1, 1913, and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Lap Welded Steel.		*Standard Charcoal Iron.*	
1¾ and 2 in.	61	1½ in.	46
2¼ in.	58	1¾ to 2¼ in.	48
2½ and 2¾ in.	64	2½ in.	53
3 and 3½ in.	69	2¾ to 3¼ in.	55½
3½ to 4½ in.	71	3½ to 5 in.	58
5 and 6 in.	64	Locomotive and steamship special grades bring higher prices.	
7 to 13 in.	61		

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.60 to 1.70
Nos. 9 and 10	1.65 to 1.75
Nos. 11 and 12	1.70 to 1.80
Nos. 13 and 14	1.75 to 1.85
Nos. 15 and 16	1.80 to 1.90

Box Annealed Sheets, Cold Rolled

Nos. 10 and 11	1.90 to 2.00
No. 12	1.90 to 2.00
Nos. 13 and 14	1.95 to 2.05
Nos. 15 and 16	2.00 to 2.10
Nos. 17 to 21	2.05 to 2.15
Nos. 22 and 24	2.10 to 2.20
Nos. 25 and 26	2.15 to 2.25
No. 27	2.20 to 2.30
No. 28	2.25 to 2.35
No. 29	2.30 to 2.40
No. 30	2.40 to 2.50

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	2.40 to 2.50
No. 12	2.50 to 2.60
Nos. 13 and 14	2.50 to 2.60
Nos. 15 and 16	2.65 to 2.75
Nos. 17 to 21	2.80 to 2.90
Nos. 22 and 24	2.95 to 3.05
Nos. 25 and 26	3.10 to 3.20
No. 27	3.25 to 3.35
No. 28	3.40 to 3.50
No. 29	3.55 to 3.65
No. 30	3.70 to 3.80

Pittsburgh

PITTSBURGH, PA., December 23, 1912.

The market has been firm, but with a noticeable decrease in the volume of new orders and specifications. A good many contracts for finished iron and steel expire by limitation December 31, and any unspecified tonnage in these contracts will probably be canceled by the mills, as they were made at lower prices than are ruling now. The pig iron market is dull. Steel is as scarce as ever, a large purchase by a leading maker attesting strongly to this. Spot furnace coke is slightly higher and scrap is steady.

Pig Iron.—New inquiries are only for small lots for prompt shipment. Consumers are pretty well covered over the first quarter and are specifying promptly for iron. All the merchant furnaces have contracts on their books for the greater part of their output for the first quarter. Higher prices are not looked for in the near future, and if present prices on coke continue, any serious decline in pig iron prices is not likely. We quote standard Bessemer iron for first half delivery at $17.25; basic, $16.50; No. 2 foundry, $17.50 to $18; malleable Bessemer, $17 to $17.25; gray forge, $16.25 to $16.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—A leading steel company has bought in the past few days 15,000 tons of open hearth billets for which it paid very close to $29, Pittsburgh, for delivery in the first quarter. This large quantity was bought to help out on billet contracts, on which the company is much behind in deliveries. Only a relatively small amount of steel is being bought in the open market and most of this is by dealers. We have advanced our quotations on open hearth billets and sheet bars, and report the market very firm as follows: Bessemer billets, $27 to $27.50; Bessemer sheet bars, $27.50 to $28; open hearth billets, $28.50 to $29, and open hearth sheet bars, $29 to $29.50, f.o.b. mill, Pittsburgh or Youngstown, Ohio. Forging billets are ruling at $35 or higher, and axle billets at $33 to $34, Pittsburgh.

Ferroalloys.—There is some inquiry for first half delivery, but consumers are holding off on account of the high prices asked. Deliveries on contracts are reported better, but there is still some call for carload lots of ferromanganese for prompt shipment, which bring $75, Baltimore. We quote 80 per cent. English ferromanganese for first half at $68 to $70; for second half, $65, and for spot shipment, $75, all f.o.b. Baltimore, the rate to Pittsburgh being $1.95 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. at $24; 11 per cent., $25; 12 per cent., $26, f.o.b. cars at furnace, Jackson, Ohio, or Ashland, Ky. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over and 12½c. in lots up to 2000 lb.

Steel Rails.—It is believed that most of the contracts for standard sections for early rolling in 1913 have been placed, and specifications against most of these contracts have been received by the mills. In the past week the Carnegie Steel Company received new orders and specifications for over 7000 tons of light rails, the heaviest week this year. Its light rail mill at Bessemer is pretty well sold up to March 1. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45-lb. sections, 1.25c., 16 and 20 lb., 1.30c.; 12 and 14-lb., 1.35c., and 8 and 10-lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Wire Rods.—A sale of 200 tons of Bessemer rods and one of 500 tons of open hearth rods are reported for early delivery at $30, Pittsburgh.

Muck Bar.—The local market is very dull. We quote standard grades, made from all pig iron, at $31, Pittsburgh.

Skelp.—A sale of 3000 tons of sheared iron plates is reported at close to 1.90c., Pittsburgh. We quote grooved skelp at 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.75c. to 1.80c.; sheared iron skelp, 1.85c. to 1.90c., delivered at buyers' mills in the Pittsburgh district.

Plates.—The steel car companies have received definite inquiries for 12,000 cars from the Harriman Lines, and the New York Central is figuring on buying 5000 to 7000 cars. These, with inquiries reported last week, make a total of 60,000 cars or more that are wanted by leading roads. The Cambria Steel Company has taken an order for 1000 hopper cars for the Baltimore & Ohio. The Norfolk & Western has placed orders for 1500 hoppers with the Mt. Vernon Car Company and the Ralston Steel Car Company. The Carnegie Steel Company reports that specifications for plates are in excess of shipments and it is getting further behind in deliveries. It is not in position to take new orders for plates for delivery before third quarter. Other leading plate mills report practically a similar situation. We quote ¼-in. and heavier tank plates at 1.45c. to 1.50c., Pittsburgh, for delivery at convenience of the mill, which would be not before second quarter and possibly third quarter, while for delivery in four to six weeks from 1.55c. to 1.60c. is quoted, and for shipment in two weeks, 1.75c. to 1.80c. can be had.

Structural Material.—Inquiries have been better. The McClintic-Marshall Construction Company took 900 tons of bridge work for the St. Louis & San Francisco Railroad, and the Cambria Steel Company 1600 tons for the Illinois Central Railroad. The Carnegie Steel Company has taken 4000 tons of plain material for a new building for the National Biscuit Company, to be erected in New York City, the fabricating being given to Eastern companies. We quote beams and channels up to 15-in. at 1.45c. to 1.50c., for delivery at the convenience of the mill, while small lots for delivery in two to four weeks are bringing from 1.75c. to 2c. or higher.

Car Wheels.—New demand continues active. The Schoen Works of the Carnegie Steel Company, which makes steel wheels, is filled up for some months. We quote 33-in. wheels for freight service at $15 to $15.50 and 36-in. for passenger cars at $19 to $19.50 per wheel, f.o.b. Pittsburgh.

Iron and Steel Bars.—The year will close with markers of iron and steel bars having contracts on their books for a good part of their entire output for the first half of 1913, particularly in steel bars. New buying in both iron and steel bars has been fairly heavy in the past month, but nearly all leading consumers are now covered for three to six months ahead. They are specifying heavily against contracts. We quote merchant steel bars at 1.40c. to 1.45c. for delivery at convenience of the mill, which means second or third quarter of next year, while for fairly prompt shipment 1.60c. to 1.75c. is readily paid by consumers, and in a few cases even higher prices have been paid. We quote iron bars at 1.70c. to 1.75c. for reasonably prompt shipment. Mills charge $1 extra per ton for twisting ¼-in. and larger steel bars and $2 extra for ½ to ⅝ in.

Sheets.—All the leading makers of sheets report that specifications against contracts are still in excess of output, so that instead of catching up on deliveries they are getting further behind. The American Sheet & Tin Plate Company cannot promise deliveries on new orders of plate mill sizes in blue annealed sheets under 14 to 16 weeks; on jobbing mill sizes from 12 to 14 weeks, and on black and galvanized sheets from 10 to 12 weeks. Other makers of high grade sheets for automobile and special work state that they have heavy

contracts on their books and are sold up for three to four months. On December 31 a good many low priced contracts for sheets will expire, and the average of prices commencing January 1 will be higher. The market is strong on the basis of 1.65c. for Nos. 9 and 10 blue annealed sheets, 2.25c. for No. 28 black sheets and 3.40c. for No. 28 galvanized.

Tin Plate.—The buying season is over, but all the mills have heavy contracts for first and second quarters and in some cases through the entire year. Several leading mills have a good part of their output under contract for the first nine months. We quote 100-lb. cokes at $3.60, and 100-lb. coke ternes at $3.45 f.o.b. Pittsburgh.

Spelter.—The market is quiet, and prices are only fairly strong. We quote prime grades of Western at 7.20c., East St. Louis, equal to 7.32½c., Pittsburgh.

Railroad Spikes.—Specifications are coming in very freely, and makers are sold up for three to four months. We quote railroad spikes in base sizes, 5⅛ x 9/16 in., at $1.90, and small railroad and boat spikes at $1.90 and $2 per 100 lb., f.o.b. Pittsburgh, for forward delivery. Small spikes have sold as high as $2.25 for prompt shipment.

Hoops and Bands.—New buying is quiet, but specifications against contracts are heavy. We quote steel bands at 1.45c. to 1.50c., with extras as per the steel bar card, and hoops at 1.50c., Pittsburgh, for shipment over first half.

Bolts and Rivets.—Makers report new buying active, and state that they are practically sold up for the first three or four months of next year. Prices are firm. We quote button head structural rivets at $2.20 and cone head boiler rivets at $2.30 per 100 lb. The discounts on bolts are as follows, in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads	75 and 5% off
Small carriage bolts, rolled threads	75 and 10% off
Large carriage bolts	70% off
Small machine bolts, rolled threads	75, 10 and 5% off
Small machine bolts, cut threads	75 and 10% off
Large machine bolts	70 and 7% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	70% off
Square hot pressed nuts, blanked and tapped	$5.70 off list
Hexagon nuts	$6.30 off list
C.P.C. and R. square nuts, tapped and blank	$5.70 off list
Hexagon nuts ⅝ and larger	$6.60 off list
Hexagon nuts smaller than ⅝	$7.20 off list
C.P. plain square nuts	$5.20 off list
C.P. plain hexagon nuts	$5.50 off list
Semifinished hexagon nuts ⅝ and larger	85% off
Semifinished hex. nuts smaller than ⅝	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic tinned, bulk	3½c. per lb. net extra
Rivets, tin plated, bulk	1½c. per lb. net extra
Rivets, metallic tinned, packages	70, 10 and 10% off

Wire Products.—The new demand for wire and wire nails is quiet, but the mills have heavy contracts on their books for delivery in the first quarter, and specifications are fairly active. We quote wire nails at $1.75 per keg; cut nails, $1.70 per keg; galvanized barb wire, $2.15 per 100 lb.; painted, $1.75; annealed fence wire, $1.55, and galvanized fence wire, $1.95, f.o.b. Pittsburgh, usual terms, freight added to point of shipment. Jobbers charge the usual advances for small lots from store.

Shafting.—Consumers are specifying freely against contracts, but new buying is light. We quote cold rolled shafting at 60 per cent. off in carload and 55 per cent. in less than carloads, delivered in base territory.

Merchant Steel.—New buying has quieted down, but specifications are still coming in freely, and shipments by the mills are heavy. We quote: Iron finished tire, 1½ x ⅜ in. and larger, 1.40c. to 1.55c., base; under 1½ x ⅜ in., 1.55c. to 1.65c.; planished tire, 1.60c. to 1.70c.; channel tire, ¾, ⅞ and 1 in., 1.90c. to 2c.; 1⅛ in. and larger, 1.80c. to 1.90c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.50c. to 1.65c.; concave and convex, 1.80c. to 1.90c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.80c. to 1.85c. We quote cold rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Merchant Pipe.—Practically all the iron and steel pipe mills have issued new lists of sizes and prices to become effective January 1. No orders for pipe for important gas or oil lines have recently been placed, but the outlook for business of this nature next year is very good. All records for output of iron and steel pipe have been broken this year, the sales and output of several leading mills being nearly 50 per cent. heavier than last year.

Boiler Tubes.—New demand is dull, as the heavy buying was done some time ago, but specifications against contracts are coming in well. All the makers of iron and steel tubes have adopted the new list prices and list weights sent out recently by the National Tube Company, and these will become effective January 1.

Iron and Steel Scrap.—Quiet conditions continue to prevail in the scrap trade, and it is probable that there will be little new buying until after January 1. Dealers that have scrap are disposed to hold it until after the turn of the year, believing that the market will then be better. No important sales have transpired. Deal ers quote, per gross ton, as follows:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$14.75 to $15.00
No. 1 foundry cast	14.50 to 14.75
No. 2 foundry cast	13.50 to 13.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	12.75 to 13.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.25 to 16.50
No. 1 railroad malleable stock	14.25 to 14.50
Grate bars	10.75 to 11.00
Low phosphorus melting stock	18.25 to 18.50
Iron car axles	24.25 to 24.75
Steel car axles	17.75 to 18.00
Locomotive axles, steel	21.75 to 22.00
Locomotive axles, iron	27.75 to 28.00
No. 1 busheling scrap	14.25 to 14.50
No. 2 busheling scrap	9.75 to 10.00
Old car wheels	15.75 to 16.00
*Cast iron borings	9.90 to 10.00
*Machine shop turnings	10.50 to 10.75
†Sheet bar crop ends	16.50 to 16.75
Old iron rails	16.25 to 16.50
No. 1 railroad wrought scrap	15.00 to 15.25
Heavy steel axle turnings	12.75 to 13.00
Stove plate	10.75 to 11.00

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—There has been some inquiry for spot coke in the past week, as it is likely that the output this week will drop heavily on account of the holidays. Several consumers, who have not heretofore been in the market for prompt coke, have bought in the past few days. Prices on spot furnace coke are firmer, and sales of 12,000 to 15,000 tons for December shipment are reported to have been made at prices ranging from $4 to $4.75, the latter having been paid for two or three small lots. We quote standard makes of furnace coke for spot shipment at $4 to $4.25 per net ton at oven. Contract furnace coke is held at about $3.25, with one or two leading dealers still asking $3.50, but it is not believed that this price can be done. Foundry coke for prompt shipment is strong at $4.50 to $4.75; on contracts $3.75 up to $4 per net ton at oven is quoted. The Connellsville Courier reports the output of coke in the Upper and Lower Connellsville regions last week as 389,064 net tons, a decrease from the previous week of 3942 tons.

Philadelphia

PHILADELPHIA, PA., December 23, 1912.

An unusual movement with the year end so close at hand has developed in crude and finished steel products. Billets have been the most active, numerous contracts having been closed, among them one large lot for first quarter and several 3000 to 5000 ton lots for first half. The aggregate has probably been well over 30,000 tons, principally in rolling billets. Eastern heavy plate makers report a marked increase in new orders, while some fair business has been moving in structural material, sheets and bars. Prices in all classes of finished material have been fully maintained, and owing to the pressure for deliveries the mills will make but brief suspensions during the holidays. With many Christmas alone will be observed. In pig iron further large business has been done with cast iron pipe makers. Reported weakness in prices has not been substantiated in standard brands. Coke is weaker, with sales of prompt furnace at concessions. The old material market is quiet, with prices practically unchanged. No movement has developed in iron ore.

Pig Iron.—While transactions in the higher grades of foundry iron have been unimportant further sales of low grade iron aggregating some 15,000 tons have been made to cast iron pipe makers. One melter reported as purchasing 5000 tons last week has taken a second block of the same quantity. Other buyers placed 1000 and 1500 ton lots among various sellers. The bulk of the sales have been for first quarter and prices vary according to analysis, the better grades bringing $17.50 to $17.75, delivered. In the higher foundry grades sales have rarely exceeded a few hundred tons, the bulk be-

ing carload lots. Standard analysis No. 2 X foundry remains firm at $18.50, delivered, minimum. Less desirable grades have, however, been sold at slight concessions without effect on the general market. Moderate inquiry for malleable pig iron for early 1913 delivery is noted. The Pennsylvania Steel Company has made a number of small sales of Mayari pig iron at $23, at furnace. The Norfolk & Western Railroad, recently inquiring for 5000 tons of mixed foundry grades for the second half, has deferred purchase until later. Virginia foundry iron has not been active, although the leading interest has made sales of second quarter No. 2 X at $15.50, at furnace, which, together with first quarter at $16, makes an average of $15.75 for first half, a price not met by other Virginia makers. With the exception of a sale of a 3000-ton lot of off grade basic to an Eastern melter the market for steel making grades is dull. Few inquiries for low phosphorus iron from consumers in this district have developed, although Western melters are making inquiries here for several thousand tons for next year's delivery. Makers of standard analysis low phosphorus iron have already disposed of a large part of their output for next year. Quotations for standard brands, delivered in buyers' yards in this district, for first quarter and in instances first half, are about as follows:

Eastern Pennsylvania No. 2 X foundry	$18.50 to $18.75
Eastern Pennsylvania No. 2 plain	18.25 to 18.50
Virginia No. 2 X foundry	18.80 to 19.00
Virginia No. 2 plain	18.55 to 18.75
Gray forge (nominal)	17.75
Basic (nominal)	18.25
Standard low phosphorus	24.00 to 24.50

Ferroalloys.—The market is quiet. Ferromanganese has been in but light demand, and seaboard quotations for 80 per cent. are unchanged as follows: Prompt, $75; first half, $67 to $70; last half, $65. Small sales of 50 per cent. ferrosilicon have been made on the basis of $75 delivered. Furnace ferrosilicon ranges from $27.30 to $29.30 delivered, according to grade.

Billets.—Contracts for both rolling and forging billets have been entered by Eastern makers for first half delivery in lots of 1000 to 5000 tons, and in a few cases for 10,000 tons. The demand is active, with buyers anxious to cover for the entire year, but in very few cases have makers been willing to take business on which delivery extends beyond the first half. Prompt billets are in active demand, but in few cases obtainable, and inquiries from other than regular customers receive no attention. Practically no export business has been entered. Prices are strong. Basic open hearth rolling billets for extended shipment are quoted at $32, delivered here; ordinary forging billets, $36, mill minimum. Prompt billets command premiums of several dollars a ton.

Plates.—Eastern plate makers report no diminution in business. Offerings are heavy in all classes of material, and few mills will accept business for delivery beyond the first quarter. Canada continues a heavy inquirer. Orders have been entered by one maker for several thousand tons of car plates for first quarter at full rates. Boat, bridge, tank and boiler plates are being heavily specified. One new order is for 1500 tons of bridge plates. Moderate export orders continue to be placed; one of several hundred tons of tank plates for South America was closed at 1.75c., seaboard. One maker in this district reports heavier orders last week than in the previous one. Prices are strong; 1.65c., delivered, can still be done for uncertain extended delivery, but first quarter prices range from 1.75c. to 1.80c., for sheared, and 1.80c. to 1.85c., for universal plates.

Structural Material.—Current demand is heavier than Eastern mills can supply, and 10 to 12 weeks represents the best producers can do on deliveries except on incidental filling in on rollings. First quarter capacities are already pretty fully covered, and makers have not opened books for second quarter, although consumers are endeavoring to have contracts accepted for that delivery. Several fair building projects have come up, involving upward of 1000 tons. Some heavier business is also in sight, although the bulk of the fabrication work is small. While 1.65c., delivered, is quoted for plain shapes, on shipments subject to the makers' option, first quarter shapes command 1.75c., with prompt delivery, when available, at 1.80c. to 2c., Eastern mill.

Sheets.—New business is being offered in large volume, particularly for extended shipment, but Eastern mills confine acceptances to the first half. Mill order books are in excellent shape, and makers find it hard to meet requests of consumers for early deliveries. An exceptionally heavy demand for No. 16 gauge has advanced the differential on that gauge from 20c. to 40c. over blue annealed. Practically all producers are behind on deliveries. Western No. 10 blue annealed sheets are quoted at 1.90c., delivered here, while Eastern mills making smooth loose-rolled sheets, easily obtain 2.05c., for reasonable delivery in this district.

Bars.—Iron bar mills are operating on a very satisfactory basis. Order books are well filled, and prompt deliveries command a wide range of prices, depending on the individual mill situation. Ordinary iron bars for uncertain delivery are quoted at 1.67½c. to 1.72½c., here, but for prompt shipment 1.75c. to 2c. is named. Steel bars available for early delivery easily bring 1.85c., although for forward shipment 1.55c. to 1.60c., delivered, can be done.

Coke.—The market is easier. Prompt furnace coke has been in better supply and prices are lower. Sales of moderate lots have been made at $3.50 to $3.75 at oven, according to grade. Contracts involving about 5000 tons for first quarter have been closed, with inquiries for 20,000 tons for first half pending. Standard furnace coke on contract is quoted at $3.25 to $3.50 at oven. The movement in foundry coke is light at $4.25 to $4.50 at oven. The following range of quotations, per net ton, is named for delivery in this district:

Connellsville furnace coke	$5.00 to $5.75
Connellsville foundry coke	5.85 to 6.50
Mountain furnace coke	4.50 to 5.00
Mountain foundry coke	5.60 to 6.10

Old Material.—While the general market exhibits the usual year-end dullness, reports are heard of some movement in No. 1 heavy melting steel for forward delivery. One sale of 10,000 tons at $15.25, delivered, is said to have been made. Occasional prompt lots, however, continue to move at $14.50 to $14.75. Further sales of old car wheels for export to Canada are reported, while buyers in this district have made moderate purchases at $16. Rolling mill grades are in light demand. Forced sales at concessions continue to crop out in practically all grades, but holders will not dispose of any quantity of material for extended forward delivery at the inside quotations. A little more firmness is shown in borings and turnings. Prices continue irregular and quotations are largely nominal. The following range about represents the market for deliveries in buyers' yards, in this district, covering eastern Pennsylvania and nearby points, taking a freight rate varying from 35c. to $1.35 per gross ton, range about as follows

No. 1 heavy melting steel (prompt)	$14.50 to $15.00
No. 1 heavy melting steel (first quarter)	15.00 to 15.50
Old steel rails, rerolling (nominal)	17.00 to 17.50
Low phosphorus heavy melting steel scrap	19.00 to 19.50
Old steel axles	20.00 to 20.50
Old iron axles (nominal)	26.00 to 27.00
Old iron rails	18.00 to 18.50
Old car wheels	16.00 to 16.50
No. 1 railroad wrought (nominal)	16.25 to 16.75
Wrought iron pipe	13.50 to 14.00
No. 1 forge fire	13.50 to 14.00
No. 2 light iron (nominal)	8.00 to 8.50
Wrought turnings	11.00 to 11.50
Cast borings	10.75 to 11.25
Machinery cast	15.00 to 15.50
Grate bars, railroad	11.50 to 12.00
Stove plate	11.50 to 12.00
Railroad malleable (nominal)	13.50 to 14.00

Chicago

CHICAGO, ILL., December 24, 1912.—(*By Telegraph.*)

The sustained volume of specifications and the heavy tonnage of new business appearing are the surprising features of the past week in this market. Railroads are specifying freely on their contracts for rails and track fastenings, and the Harriman inquiry for 12,000 cars, most of which are likely to be built in Western shops, is typical of the unceasing demand for rolling stock. There is pending in Chicago an aggregate of 28,000 tons of structural material for new buildings, contracts for which are to be placed in the immediate future. While the leading interest is, in this territory at least, meeting the crest of the tonnage wave, other mills report specifications only slightly less than the record weeks of the year and generally above the average. In the pig iron market a large inquiry for charcoal iron is noted for car wheel manufacture, and a generally active inquiry in which malleable iron is prominent is reported. The old car wheel situation has grown decidedly interesting, as the apparent supply is far from equal to the unprecedented demand. Prices for old wheels recently have shown strength where the balance of the scrap market has been weak, and further advances appear inevitable.

Pig Iron.—While the current demand for Southern iron is limited, every other indication in the local mar-

ket points to conditions that will be increasingly firm. Inquiry for Northern iron is active and has in it many evidences that foundries, particularly those making railroad castings, are facing larger demands on their capacity than they had anticipated or prepared for. The principal inquiry is for 2500 to 5000 tons of charcoal iron to be used by a car builder for wheels, while other inquiries, including one of 1000 tons of malleable, are reported. In view of the demand that is already developing for additional iron in the first quarter and with the coke situation unrelieved, evidence is largely in favor of increasing firmness. Current quotations are unchanged. We quote local irons, f.o.b. furnace, the average switching charge to Chicago foundries being about 50c. a ton. Other quotations are for Chicago delivery. Prices on prompt shipment are as follows:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$18.75 to $19.75
Northern coke foundry, No. 1	18.50 to 18.75
Northern coke foundry, No. 2	18.00 to 18.25
Northern coke foundry, No. 3	17.50 to 18.00
Southern coke, No. 1 foundry and No. 1 soft	18.85 to 19.35
Southern coke, No. 2 foundry and No. 2 soft	18.35 to 18.85
Southern coke, No. 3	17.85 to 18.35
Southern coke, No. 4	17.35 to 17.85
Southern gray forge	17.35 to 17.85
Southern mottled	16.85
Malleable Bessemer	18.00 to 18.25
Standard Bessemer	19.40 to 19.90
Basic	17.75 to 18.25
Jackson Co. and Kentucky silvery, 6 per cent	20.40
Jackson Co. and Kentucky silvery, 8 per cent	21.40
Jackson Co. and Kentucky silvery, 10 per cent	22.40

(By Mail)

Rails and Track Supplies.—With the closing of the tonnage for the Harriman Lines, the important rail business for the West is practically arranged. On contracts placed both for rails and track fastenings specifications are being booked at a surprising rate. We quote standard railroad spikes at 1.95c. to 2.05c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, $32 to $34.50 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The inquiry of the Harriman Lines for 12,000 cars rounds out a wonderful year of car buying that involves a tonnage of structural material the rolling of which is not scheduled to be completed until 1914. In addition to the tremendous tonnage for rolling stock the amount of architectural work in sight for the spring months is constantly increasing and is causing considerable speculation as to the source of the material. In Chicago alone new buildings, including two for the Marshall Field estate, the New Morrison Hotel and the new Stevens store, will require 28,000 tons. We quote for Chicago delivery from mill, on plain shapes, 1.63c.

Warehouses are continuing to supply a large portion of the current requirements of the fabricating shops, and orders in December are even heavier than in November. Quotations are unchanged on the basis of 2.05c.

Plates.—There are no new developments in this market affecting plates. The larger mills are either sold up into the future almost indefinitely or are refusing business. The mill tonnage available for prompt shipment is being held at prices practically equivalent to store quotations. We quote for mill shipment, Chicago delivery, 1.63c.

From store, we continue to quote for base sizes, $2.05.

Sheets.—The leading independent mill has little or no sheet tonnage to offer for the first half, and as it has thus far avoided opening its books for the second half it is practically out of the market. Car buying, however, extending so far into the future has necessitated the consideration of some sheet business impossible to avoid. Regular market prices are unchanged, but premiums are readily obtained for shipment in three or four weeks. We quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.43c. to 2.53c.; No. 28 galvanized, 3.58c. to 3.68c.; No. 10 blue annealed, 1.83c. to 1.88c.

For sheets out of store we quote as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.80c., and No. 28 galvanized, 4.05c.

Bars.—The bar iron capacity in this territory has been fully taken up for several months past with current business as it materializes from day to day, and a disposition is growing to limit more closely sales into the future. Quotations are still moving upward, and 1.60c. is the general minimum for new business. It is not expected that there will be any great volume of specifications for steel bars on the contracts expiring January 1, as most of these contracts are either overspecified or already completed. We quote for mill shipment as follows: Bar iron, 1.57½c. to 1.60c.; soft steel bars, 1.58c. to 1.65c.; hard steel bars, 1.60c. to 1.70c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

Local construction work is almost entirely dependent upon store shipment of reinforcing bars, as the contractors wishing to take advantage of weather conditions require immediate service. The demand for merchant bars is also surprisingly well maintained. For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes ¼ in. and over, and 7½c extra for smaller sizes; shafting 55 per cent. off.

Rivets and Bolts.—Bolt and nut manufacturers whose trade has slackened somewhat are finding the situation slightly easier also as regards deliveries, and some progress is being made toward the betterment of shipments. The pending and prospective structural work for the coming spring gives promise of considerable additional buying of rivets for first quarter requirements soon after the new year opens. Prices are firm, following the advance. We quote from mill as follows: Carriage bolts up to ⅝ x 6 in. rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to ⅜-in. x 4 in., rolled thread, 75-10-5; cut thread, 75-10; large sizes, 70-7½; coach screws, 80-10; hot pressed nuts, square head, $5.70 off per cwt.; hexagon, $6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 2.38c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-7½; larger sizes, 65-5, carriage bolts up to ⅜ x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, $5.30, and hexagon, $5.90 off per cwt.

Wire Products.—The approaching close of business for the year finds the leading manufacturers of wire products operating at capacity and yet with much diminished stocks in warehouse to meet the demands for the early spring trade. Current business is very generally reduced to the usual lull of the season, although fabricators of fencing are not less insistent upon the delivery of material due them. Prices are firm for all of the various wire products, and we quote as follows: Plain wire, No. 9 and coarser, base, $1.73; wire nails, $1.93; painted barb wire, $1.93; galvanized, $2.33; polished staples, $1.93; galvanized, $2.33, all Chicago.

Cast Iron Pipe.—The month of December has failed to materialize any pipe orders of consequence, and the letting scheduled for December 30 at St. Paul will doubtless carry over into the New Year. The prospective tonnage in the Pacific Northwest is likewise held in abeyance. A number of small orders have been booked. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $31; 6 to 12 in., $29; 16 in., and up, $28, with $1 extra for gas pipe.

Old Material.—There has been very little change in market values of scrap since the last report. The general tendency is still toward weakness, though this is more pronounced with regard to steel and mill scrap than to foundry scrap. A fair demand for both railroad and agricultural malleable is noted. Railroad lists offering a total approximating 5600 tons include 2500 tons from the Chicago, Burlington & Quincy; a similar quantity from the Chicago, Milwaukee & St. Paul, and 600 tons from the Chicago & Alton. The principal items were railroad wrought, old steel rails and malleable scrap. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	$17.25 to $17.75
Old steel rails, rerolling	16.25 to 16.75
Old steel rails, less than 3 ft	14.50 to 15.00
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	16.75 to 17.25
Heavy melting steel scrap	12.50 to 13.00
Frogs, switches and guards, cut apart	12.50 to 13.00
Shoveling steel	12.25 to 12.75
Steel axle turnings	11.00 to 11.50

Per Net Ton.	
Iron angles and splice bars	$16.00 to $16.50
Iron arch bars and transoms	16.50 to 17.00
Steel angle bars	12.50 to 13.00
Iron car axles	21.50 to 22.00
Steel car axles	18.00 to 18.50
No. 1 railroad wrought	12.75 to 13.25
No. 2 railroad wrought	12.25 to 12.75
Cut forge	12.25 to 12.50
Steel knuckles and couplers	12.75 to 13.25
Steel springs	13.25 to 13.75
Locomotive tires, smooth	14.00 to 14.50
Machine shop turnings	8.00 to 8.50
Cast and mixed borings	6.75 to 7.25
No. 1 busheling	11.25 to 11.75
No. 2 busheling	8.25 to 8.75
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	13.00 to 13.50
Stove plate and light cast scrap	10.75 to 11.25
Railroad malleable	13.50 to 14.00
Agricultural malleable	11.75 to 12.25
Pipes and flues	10.00 to 10.50

Cleveland

CLEVELAND, OHIO, December 24, 1912.—(*By Telegraph.*)

Two independent steel companies have booked a moderate tonnage for last half delivery of steel bars at 1.40c., Pittsburgh, and plates and structural material at 1.50c. One of the companies that already had considerable tonnage on its books for the last half quickly sold all of the remainder. The Nickel Plate Railroad has bought 5000 tons of Bessemer rails from the Lackawanna Steel Company. Among new inquiries is one from a Cleveland concern for 2000 tons of plates and shapes for specific work.

(*By Mail.*)

Iron Ore.—Ore carrying charges for the season of 1913 have been established at an advance of 5c. over the 1912 figures, making the rates 45c. from Duluth, 40c. from Marquette and 30c. from Escanaba. Ore shippers are well satisfied with the new rates. Some of the vessel men expected a 10c. advance, but they are not objecting to the new rate. The earning capacity of the ore fleet will be increased $2,500,000 for the season, based on the expected movement of 50,000,000 tons. The chartering season opened in the past week and a very heavy tonnage is already under contract. Ore firms expect to be able to use all the available vessels to move the heavy tonnage that will be shipped. It is estimated that by January 1 75 per cent. of the ore to be moved will be covered by lake freight contracts. In spite of the general advance one ore firm claims to have placed contracts to move 350,000 tons at the 1912 rates. The railroads doing business at Escanaba have announced that they will make a charge of 5c. a ton next season for loading ore boats, this charge being borne by the shipper. This is another way of advancing carrying rates, which railroads contend are too low. Shippers from Escanaba are protesting vigorously against this advance. The ore market is generally quiet, although a few small lot sales are reported. We quote prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.60; Mesaba non-Bessemer, $3.40.

Pig Iron.—The market continues very quiet. A few sales of Northern foundry iron are reported in lots of 200 tons and under for prompt shipment in the first half. Prices are firm, but quotations are unchanged. The consumption continues heavy and furnace stocks in this district have been reduced considerably in the past few weeks. For several weeks there has been practically no inquiry for Southern iron, but some demand has sprung up in the past few days. We note the sale of 300 tons of No. 2 to a local melter at $14, Birmingham, for the first quarter. The supply of $13.50 resale iron for prompt shipment appears to have largely disappeared. A sale of 700 tons of Southern charcoal iron was made, for shipment to the Pittsburgh district in the second and third quarter at $25, Birmingham. For prompt shipment and for the first half of 1913 we quote, delivered Cleveland, as follows:

Bessemer	$18.15
Basic	$17.40 to 17.75
Northern No. 2 foundry	17.75 to 18.00
Southern No. 2 foundry	18.35 to 18.85
Gray forge	17.00 to 17.25
Jackson County silvery, 8 per cent. silicon	20.55 to 21.55

Coke.—The market is not active, but prices are very firm. Some small foundry coke contracts for the first half were placed in the week at $4.25. The better grades of Connellsville furnace coke are held at $3.25 to $3.50 per net ton at oven for the first half and $3.25 for the entire year. For spot shipment furnace coke is quoted at $4, and 72-hour foundry coke at $4.50 to $4.75.

Finished Iron and Steel.—Considerable new tonnage is expected to come out early in the year for work of various kinds, for which mill agencies have received inquiries and on which they have given prices during the past few days. While the general demand has not been heavy it has been more active than is usual just before the holidays. Some steel bar contracts are being placed for the first half, but most of the mills are so well sold up that they do not care to take on additional business. Bids for two important projects were opened by the city of Cleveland. J. L. Stuart of Pittsburgh was the low bidder for the completion of the city hall building, requiring about 500 tons of steel. The C. H. Fath & Son Construction Company was low bidder for the substructure for the land span and the Phee Construction Company of Chicago for the substructure for the river span for the new Clark avenue bridge that will take from 250 to 1200 tons of sheet piling, the amount depending on the plans of the successful contractors. There is a fair demand for iron bars, on which the market is very firm, with 1.60c., Cleveland, as the minimum quotation. Warehouse business continues fairly heavy. Warehouse prices are unchanged at 2.10c. for steel bars and 2.25c. for plates and structural material.

Old Material.—The market is very quiet and prices are weak. Mills generally are loaded up with material as a result of recent heavy shipments, and that fact, together with holiday and inventory time is keeping them out of the market. There is considerable scrap on the market in almost all grades, but dealers are not trying to force sales except of small lots loaded on cars. The Nickel Plate Railroad closed December 21 on a small list. There has been no further recession in prices, but quotations are largely nominal. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton.

Old steel rails, rerolling	$15.00 to $15.50
Old iron rails	17.50 to 18.00
Steel car axles	18.75 to 19.25
Heavy melting steel	13.50 to 14.00
Old car wheels	14.50 to 15.00
Relaying rails, 50 lb. and over	23.00 to 23.50
Agricultural malleable	12.50 to 13.00
Railroad malleable	14.00 to 14.50
Light bundled sheet scrap	12.50 to 13.00

Per Net Ton.

Iron car axles	$21.00 to $22.00
Cast borings	7.75 to 8.00
Iron and steel turnings and drillings	8.00 to 8.50
Steel axle turnings	9.25 to 9.50
No. 1 busheling	11.50 to 12.00
No. 1 railroad wrought	13.50 to 14.00
No. 1 cast	13.00 to 13.50
Stove plate	10.00 to 10.50
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO. December 23, 1912.

Pig Iron.—Considerable interest is manifested on the part of a number of large melters in last half prices. As far as known, no important buying has been done for that period, and few furnaces in either the Southern or Hanging Rock districts are willing to name quotations. However, a limited number of foundries have been able to cover on contracts taken for castings, and it is understood that only a small advance over first half figures was inserted in contracts. Prices are firmer, and only a limited quantity of resale No. 2 foundry is obtainable below $17, Ironton, for prompt shipment. In the South $14, Birmingham basis, appears to be firmly established. Both of the prices named could be inserted in contracts extending through the first half of next year. Only a few inquiries are out, all of which have been previously reported, with the exception of one from a Michigan manufacturer, calling for about 600 tons of foundry iron for first half shipment, while a Canadian melter expects to close soon for 500 tons of No. 2 Southern also for first half. As stated above, a number of the larger buyers are feeling the market for last half shipment, but have not yet put out open requests for prices on any stipulated tonnage. Malleable and basic are quiet. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote f.o.b. at Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft.	$17.50 to $17.75
Southern coke, No. 2 foundry and 2 soft.	17.25 to 17.50
Southern coke, No. 3 foundry	17.00 to 17.25
Southern, No. 4 foundry	16.75 to 17.00
Southern gray forge	16.50 to 16.75
Old silvery, 8 per cent. silicon	20.20 to 20.70
Southern Ohio coke, No. 1	18.70 to 19.20
Southern Ohio coke, No. 2	18.20 to 18.70
Southern Ohio coke, No. 3	17.95 to 18.45
Southern Ohio malleable Bessemer	17.70 to 18.20
Basic, Northern	18.20 to 18.70
Lake Superior charcoal	19.25 to 19.75
Standard Southern car wheel	27.25 to 27.75

Coke.—Both furnace and foundry coke are only obtainable for prompt shipment at exorbitant prices, as compared with those prevailing a year ago. Oven operators report the labor situation as more serious during the holiday season, and, while contract prices for future delivery are unchanged, almost any figure is charged for immediate shipment. Several carload lots of 48-hr. coke have lately brought $5 per net ton at oven in all three districts. Contract furnace coke is quotable around $3.50 per net ton at oven in the Connellsville, Wise County and Pocahontas districts, with an advance of 25c. to 50c. for foundry grades.

Finished Material.—The holiday season has brought no let-up in the urgent demand for shipments on contracts. Excellent weather conditions have enabled builders in the Central West to go ahead on work that was scheduled for postponement until the beginning of the spring season. As a consequence all kinds of structural material is in demand, and warehouse stocks have been almost depleted. Local warehouses are ob-

taining from 2.20c. to 2.30c. for beams and channels and around 2.15c. for steel bars.

Old Material.—There is very little doing, but, while prices are weak, there are no changes to be made in last week's quotations. It is understood that a number of railroads will have a considerable quantity of scrap to offer early next year, but, as a rule, dealers' yards are fairly well stocked. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. yards:

Per Gross Ton.

Bundled sheet scrap	$10.50 to $11.00
Old iron rails	14.25 to 14.75
Relaying rails, 50 lb. and up	21.25 to 21.75
Rerolling steel rails	13.25 to 13.75
Melting steel rails	11.25 to 11.75
Old car wheels	12.75 to 13.25

Per Net Ton.

No. 1 railroad wrought	$11.25 to $11.75
Cast borings	7.25 to 7.75
Steel turnings	7.75 to 8.25
No. 1 cast scrap	11.00 to 11.50
Burnt scrap	7.75 to 8.25
Old iron axles	18.25 to 18.75
Locomotive tires (smooth inside)	12.00 to 12.50
Pipes and flues	7.75 to 8.25
Malleable and steel scrap	9.25 to 9.75
Railroad tank and sheet scrap	6.75 to 7.25

St. Louis

ST. LOUIS, MO., December 23, 1912.

Although the past week naturally was one of quiet, it was productive of at least one interesting feature—the revival of heavy specifications on contracts in all lines and multiplication of insistence on prompt forwarding of allotments.

Pig Iron.—Inquiries as well as sales have been of small quantities, apparently intended to meet immediate requirements or to fill in needs of special character. Requisitions for shipments on contract, however, have been fully up to the allotments contemplated when the contracts were made and many of them in excess thereof. The urgency of the demand for shipment has been emphasized in a way to indicate that the needs are very real to the consumer and that the iron is going into use as fast as received.

Coke.—The situation seems to be getting worse as far as obtaining coke is concerned, while the holiday conditions in cars are adding to the trouble. The quotations at this point now are $4.50, at oven, for best selected 72-hour Connellsville foundry coke for prompt shipment, which is now held to mean within a reasonable time, and $4 for contract. By-product coke is quiet at Connellsville basis figures.

Old Material.—The slackening of demand has made the scrap market rather dull, with a sagging tendency. There is still a lively demand for relayers, but in the other divisions of the market prices are softening. Dealers believe that after the inventory period and the holidays, the mills and foundries will be in the market again. No lists came out during the week and none are expected now until after January 1. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton.

Old iron rails	$15.00 to $15.25
Old steel rails, rerolling	14.25 to 14.75
Old steel rails, less than three feet	13.25 to 13.75
Relaying rails, standard section subject to inspection	23.50 to 24.50
Old car wheels	14.25 to 14.75
Heavy melting steel scrap	12.75 to 13.25
Frogs, switches and guards cut apart	13.00 to 13.50

Per Net Ton.

Iron fish plates	$12.25 to $12.75
Iron car axles	20.00 to 20.50
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	11.75 to 12.25
No. 2 railroad wrought	11.25 to 11.75
Railway springs	11.25 to 11.75
Locomotive tires, smooth	12.75 to 13.00
No. 1 dealers' forge	9.25 to 9.75
Mixed borings	7.75 to 8.00
No. 1 busheling	10.75 to 11.00
No. 1 boilers' cut to sheets and rings	7.75 to 8.00
No. 1 cast scrap	11.75 to 12.25
Stove plate and light cast scrap	8.75 to 9.00
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.00 to 10.50
Pipes and flues	7.75 to 8.00
Railroad sheet and tank scrap	7.25 to 7.75
Railroad grate bars	9.25 to 9.75
Machine shop turnings	8.75 to 9.25
Bundled sheet scrap	7.50 to 8.00

Finished Iron and Steel.—A distinct revival of interest has occurred among those having contracts, and the specifications thereon were very heavy, which is taken by mill representatives to mean that consumers have reached the conclusion that the only problems to be considered are the completion of existing work. Inasmuch as much of the trade is contracted six months and even more ahead from the consumer's standpoint, the day of worry is regarded as having been put off that far. In standard steel rails there were intimations that some consideration of orders would be given by Southwestern roads after the first of the year. In light rails there was considerable activity, the coal interests buying quite freely and the lumber interests coming in strongly, one company buying about 15 miles. In structural steel the specifications on contract were large; fabricators are very busy. In bars the demand keeps up, while plates are still so far off in delivery as to be an uninteresting item to the trade here. Agricultural and wagon interests are actively employed. Track fastenings are still quite active, especially for the season.

Birmingham

BIRMINGHAM, ALA., December 23, 1912.

Pig Iron.—The Southern iron market is difficult to analyze. Each furnaceman takes a different view and statements as to sales prices vary. The market is without buoyancy. A sale approximating 1000 tons was made at $14 for first half delivery to a regular customer by a company which for some time has declared its spot and first quarter minimum to be $14.50 and its second quarter price $15. This is the first second quarter sale made by it. It is presumed that the same price can be secured by other consumers for the same delivery. A well posted authority declares that the resale iron for some time offered in the Birmingham market at $13.50 consists of 2500 to 3000 tons of iron made months ago at a furnace now idle and is offered by Pittsburgh and New York parties at a profit over what they paid for it shortly after being manufactured. The trade has thus far shown no inclination to take this iron. One cannot locate any furnace interests selling under $14, and there seems no reason to believe that this has been done. However, there is good reason to believe that $14 iron is available in good quantities both for spot and first quarter. At the same time carload lots for immediate requirements continue to fetch $14.50 and $14.75 as the usual terms of trade. A sale of 2000 tons of Clifton iron was made at $15. The Tennessee Coal, Iron & Railroad Company has blown in the sixth furnace at Ensley on basic and now has all its available stacks in operation, namely, six at Ensley, four at Bessemer and Alice in Birmingham. The Little Belle at Bessemer and the Oxmoor plants are not in working condition. The additional basic iron will probably go into use at the steel plant of the company, although there is some outside inquiry for basic and the Tennessee company has already sold 15,000 tons of basic at $14.50 for first and $15 for second quarter. Italian consumers are sounding the market and additional foreign orders will be placed if satisfactory ocean freights can be secured. These freights are much higher than a year ago, the minimum being about $4.50 to $5. Charcoal iron is in strong demand, selling at $25 to $25.50. No change is made in quotations, which for spot and first quarter are as follows:

No. 1 soft and foundry	$14.50 to $15.00
No. 2 soft and foundry	14.00 to 14.50
No. 3 foundry	13.75 to 14.25
No. 4 foundry	13.50 to 14.00
Gray forge	13.25 to 13.75
Basic	14.00 to 14.50
Charcoal	25.00 to 25.50

Coal and Coke.—The coal situation is acute, with domestic yards depleted and steam coal difficult to obtain on acount of the scarcity of cars and the fire at Banner mines of the Pratt Consolidated. Coke is very strong, prices for good foundry ranging from $3.75 to $4 per net ton at oven.

Old Material.—Light cast is in special demand and relaying rails have been disposed of in considerable quantities for construction. The market is quieter than it has been, but prices remain unchanged as follows, per gross ton, f.o.b. cars at dealers' yards:

Old iron axles	$15.50 to $16.50
Old steel axles	15.50 to 16.00
Old iron rails	14.50 to 15.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	11.50 to 12.00
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	9.00 to 9.50
No. 1 machinery cast	11.50 to 12.00
No. 1 heavy melting steel	11.50 to 12.00
Tram car wheels	12.00 to 12.50
Standard car wheels	13.00 to 13.50
Light cast and stove plate	10.00 to 10.50

S. DIESCHER & SONS.
Mechanical and Civil Engineers.

Cast Iron Pipe.—It has been quiet in pipe circles as far as new orders are concerned, but the plants are busy on previous orders and shipments equal the output. Some good inquiries are in the market, but no orders beyond those of a filling-in nature are reported. Prices remain firm at $24.50 for 4-in. and $22.50 for 6-in. and up, with $1 added for gas pipe. Special fittings range from $45 to $50 per ton.

The German Iron Trade

A Quieter Tendency Observed

BERLIN, December 12, 1912.

A somewhat quieter tendency prevails. For some steel products orders are coming in slowly, both consumers and dealers maintaining a waiting attitude. This fact, however, is not regarded as of immediate or very great significance, inasmuch as most mills are supplied with orders that will keep them employed till next spring. The November shipments of the Steel Works Union, as provisionally determined, amounted to about 485,000 tons, or 65,600 tons less than for October. The reduction was in semi-finished material and structural shapes; rail shipments kept up nearly to the October level.

Pig Iron Still Scarce

The scarcity of pig iron has not been alleviated, owing in part to the shortage of cars. Notwithstanding the latter difficulty, however, the November shipments were 3.12 per cent. above the allotments, as against 3½ per cent. in October. Consumers are still urging the furnaces to ship iron; many of them are even sending registered letters—the usual German method of intimating that legal proceedings may be expected. The calls for delivery are in excess of the capacity of the furnaces. It is mentioned that one big furnace company situated on the seacoast has informed its customers that it refuses to accept delivery orders before January 1, and even then it cannot agree to deliver under eight weeks. According to some of the reports, the Essen Syndicate has almost sold out the full capacity of the furnaces for the first half of 1913, but the report given out by the Düsseldorf Exchange last week said that the furnaces are sold out till September 1. The Syndicate has received so many orders for higher grades that it has temporarily suspended taking orders in these until it can go over the orders in hand and make assignments to the furnaces. Sales will be resumed next week at unchanged prices.

The production of pig iron in November amounted to 1,537,000 metric tons. This is 52,000 tons less than for October, but 223,400 tons more than for November, 1911. The daily rate of production in November was about 1000 tons less than in October—a result due to the scarcity of coal and coke through the car famine. For 11 months the production reached 15,985,800 tons, as compared with 14,156,600 tons in the like months of 1911. The gain was about 11½ per cent.

The preliminary trade statistics for November show the following movement in iron and ores: Imports of ores, 1,068,000 tons, as compared with 725,700 tons a year ago, and exports 169,700 tons, against 203,700 tons. Exports of pig iron, 80,480 tons, against 88,892 tons; billets, blooms, etc., 57,128 tons, against 50,066 tons; structural shapes, 38,992 tons, against 30,586 tons; steel rails, 42,569 tons, against 32,072 tons.

The Wire Trade

The foreign business in rods continues active, but home business is quiet pending the negotiations for the prolongation of the association. It is now reported that an agreement has been reached to continue the organization provisionally till June 30 in order to gain time for further negotiations with outsiders. The preparations among some of the big southwestern establishments for increasing the production of wire and nails, however, offer a practically insurmountable obstacle to the formation of trade combinations in these products. Thus it is mentioned that the Rümelingen-St. Ingbert concern is preparing to work up 120,000 tons of rods yearly into wire and nails; and the Deutsch-Luxemburg Company will also take up wire production on a big scale.

An advance in commercial castings of 1.50 marks per metric cwt. has just been made by the Lower Rhine group of the general organization of foundries. The Hessen-Nassau group raised machinery and building castings 1 mark per cwt. Products made of galvanized iron plates have been raised 2 per cent. Further advances in the general market are hardly to be expected for several months in view of the fact that most prices have been fixed for the next quarter at least. The uncertain political situation, if it continues, will also prevent advances in goods not controlled by trade organizations. Scrap is finding good sale at somewhat better prices.

Various Products

In bars conditions remain much as previously described. The mills are adhering firmly to a minimum price of 125 marks, but dealers are trying unsuccessfully to get better terms. Foreign business remains quite active at satisfactory prices.

Trade in gas pipe and boiler tubes continues remarkably strong. Orders are coming in from both home and foreign markets in large volume, and the mills have work ahead for months at their utmost capacity. The foreign market in particular is an active buyer; export prices are satisfactory. The convention existing in this branch of the trade is working very well and its prices are well maintained. A meeting is to be held to discuss its prolongation, or the possibility of converting it into a syndicate; but owing to the refusal of the Mannesmann Company, Düsseldorf, to join the organization, this latter plan will hardly lead to anything.

In heavy plates—other than ship plates, apparently—it is said that a slightly weaker price tendency is observable. This is probably due to the fact that the heavy plates convention has almost ceased to exist. Cold-rolled bands have grown considerably quieter. Here, too, consumers and dealers are reckoning upon the breaking up of the organization.

Machinery Builders Well Employed

At a recent meeting of the Association of German Machine Builders the chairman pointed out that his reports from the various branches of the trade indicated that the improvement that began last year has been maintained, and that the shops are now everywhere well employed; some of them have so much work to do that they complain of a scarcity of skilled labor. He adverted to the fact that the increase in the cost of raw materials and labor had considerably raised the cost of producing machinery, whereas the prices of the latter have not yet been raised in due proportion owing to the very sharp competition and the cutting of prices by certain firms.

Efforts are being made to organize the concerns producing steel castings. At a meeting recently held the works represented declared themselves agreed to the idea of effecting an organization, and another meeting was appointed. In the meantime, the support of concerns not represented at this meeting will be solicited.

The Belgian market sends in news of rising prices. The export price of rails was advanced 2s. 6d. last week, and orders for some 5000 tons from Spain and England were taken. This week a Brussels dispatch says that the home price of basic and puddling iron has been raised 2 francs, and foundry iron 1 franc. Correspondence from the Belgian trade appearing in the German press is of a strong tone; the recent depression is evidently over. According to a Brussels dispatch, Belgian works have just captured an American order for 3000 tons of structural goods in competition with makers in the United States.

British Pig Iron Market Firm

Stocks Slightly Less—Demand Still Strong for Semi-Finished Steel

(By Cable)

MIDDLESBROUGH, ENGLAND, December 23, 1912.

There is holiday inactivity, but markets are firm. Cleveland iron is believed to be much oversold by speculators. Good shipments are made and are expected to continue from Middlesbrough. Stocks of warrant iron in Connal's stores are 239,941 tons, against 243,100 tons one week ago. Demand continues strong for semi-finished steel. We quote as follows:

Cleveland pig iron warrants (closing Monday) 67s. 1d. against 66s. 8½d. on December 16.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 67s. 6d. against 67s. one week ago.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £6, for January-March delivery.

German sheet bars, f.o.b. Antwerp, 112s. 6d.

German 2-in. billets, f.o.b. Antwerp, 107s.

German basic steel bars, f.o.b. Antwerp, £6 4s.

Steel bars, export, f.o.b. Clyde, £8 5s.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £7 10s.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel ship plates, Scotch, delivered local yard, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 15s. 1½d.

Buffalo

BUFFALO, N. Y., December 23, 1912.

Pig Iron.—Sales in the Buffalo district the past week in all grades of iron aggregated probably 25,000 to 30,000 tons. The situation has been somewhat surprising as regards the continued briskness in demand, inasmuch as December is usually a quiet month but, apparently in line with other precedents that have been broken this year, business appears not to have been interrupted by approaching inventories and holidays. Many foundries are so busy that they have decided to postpone their annual inventory, usually taken about January 1, or allow it to be passed entirely this year. One of the vexatious features now becoming more pronounced is the congestion that is occurring on some railroads, as the rush of business is overtaxing their capacity to handle it. Furnaces are shipping to the full extent of their output, but even this rate does not entirely meet the demand. Prices continue firm as per the following schedule for first half delivery f.o.b. Buffalo:

No. 1 foundry	$17.50 to $18.25
No. 2 X foundry	17.25 to 18.00
No. 2 plain	17.25 to 17.75
No. 3 foundry	16.75 to 17.50
Gray forge	16.50 to 17.25
Malleable	17.25 to 18.00
Basic	18.00 to 18.25
Charcoal, regular brands and analysis	18.75 to 19.25
Charcoal, special brands and analysis	22.00

Finished Iron and Steel.—With some of the mills delivery conditions are easing up in certain products while with other mills they are becoming even more extended than they have been. A number of sales agencies are continuing to accept tonnage with the distinct understanding that shipments are to be made at convenience. All mills are still adhering to the policy of not taking business from other buyers than well established customers. Ruling prices for future delivery are very firm at 1.40c. to 1.45c. for steel bars and 1.50c. for plates and shapes, while some of the smaller Eastern mills—as mentioned last week—are obtaining 1.60c. to 1.75c. for structural material for fairly prompt deliveries. Even these mills are booking so fully at these prices that they cannot now promise delivery under three months. In fabricated structural steel the market displays only moderate activity for current work with very few lettings for deliveries before next spring, and the prospects are that the situation will remain quiet until after the first of the year. Bids will be opened today for steel for the new city hall at Geneva, N. Y., 150 tons, and the Montgomery Trust Company, Amsterdam, N. Y., will receive bids at once for a small tonnage for its new bank building. The Lackawanna Bridge Company, Buffalo, is low bidder for the 200 tons required for the new plant of the J. P. Devine Company in this city. M. I. Ford, Binghamton, N. Y., has received contract for steel work for the drug manufacturing plant to be erected by W. H. Loveland & Co., in that city.

Old Material—The demand continues slack in most commodities, with the noteworthy exception of old car wheels, and prices are not strong. Most users are apparently quite fully supplied for their needs for some time ahead and are taking on only a limited amount of material until after the inventory period. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$15.00 to $15.50
Low phosphorus steel	16.75 to 17.25
No. 1 railroad wrought	15.50 to 16.00
No. 1 railroad and machinery cast scrap	13.50 to 14.25
Old steel axles	16.50 to 16.75
Old iron axles	23.75 to 24.00
Old car wheels	16.00 to 16.75
Railroad malleable	13.25 to 13.50
Boiler plate sheared	14.50 to 15.00
Locomotive grate bars	11.25 to 11.75
Wrought pipe	10.00 to 10.50
Tank iron	10.25 to 10.75
Wrought iron and soft steel turnings	8.75 to 9.00
Clean cast borings	8.00 to 8.50

The stockholders of the recently incorporated Galion Brass Foundry Company, Galion, Ohio, have elected the following directors: C. J. Rath, D. L. Sites, J. G. Brown, Carl J. Gugler and C. D. Morgan.

New York

NEW YORK, December 24, 1912.

Pig Iron.—The pig iron market has not been active in the past week, but in this district, including nearby New Jersey points, probably 1500 tons is pending, in lots of 200 to 500 tons. The deliveries wanted are first quarter and second quarter, and in addition to foundry grades there is some call for malleable pig iron. Most of the business reported in eastern districts has been done by eastern Pennsylvania furnaces, three pipe companies having bought in the last ten days a total of 20,000 to 25,000 tons. The lowest price reported is $17, delivered, but this was where special conditions existed, delivery by barge being possible from furnace to pipe works. The usual prices for pipe iron have been $17.50 to $17.75, delivered. While some foundry iron has been offered by a steel company no considerable sales are reported and prices are very generally held at the figures prevailing in the past month. Some slight increase in production in the Lehigh Valley is expected through the blowing in of a small furnace this week, while another furnace of the same interest may be started early in the year. Ability to get coke is the deciding factor and the coke situation does not show signs of easing up. We quote as follows for Northern iron at tidewater: No. 1 foundry, $18.50 to $18.75; No. 2 X, $18.25 to $18.50; No. 2 plain, $17.75 to $18. Southern iron is quoted at $18.75 to $19 for No. 1 foundry and $18.50 to $18.75 for No. 2.

Structural Steel.—New inquiry for steel buildings has not materialized in any volume and generally the week has been quiet, as was to be expected. Specifications for plain material have taken a spurt, showing still a desire to provide against difficulties in future deliveries and also in a number of cases to take advantage of low priced contracts. The Phoenix Bridge Company took 800 to 900 tons for a bridge at Syracuse on the New York Central, and the American Bridge Company took a 200-ton contract for the Southern New England Telephone building at Waterbury, Conn. We quote plain material at 1.61c. to 1.86c., New York, the former for delivery in the third quarter of 1913, for mill shipment, and 2.25c. from store.

Steel Plates.—There is no change in the situation but much is expected after the first of the year. One of the important developments in the car buying line is the inquiry of the Harriman Lines for about 12,500 cars, among the number being 400 hopper, 2280 gondola, 203 tank, 110 caboose, 6390 box cars, about half with single sheathing and half with double sheathing, 2050 stock cars, mostly 36 ft. long, but about one-quarter of them 40 ft., and 500 flat cars. The Missouri, Kansas & Texas placed 2000 cars with the American Car & Foundry Company, and 2000 refrigerator cars have been purchased, half the number by the American Refrigerator Transit Company, and the other half by the Santa Fé. Sheared plates are 1.61c. to 1.76c., New York, the former price for delivery in the third quarter of 1913, and universal plates remain generally at $1 a ton higher.

Iron and Steel Bars.—One of the large producers of bar iron and bar iron products had the largest day in its history last Friday in orders booked, indicating the continued effort to close with mills for all the business that can possibly be settled. Specifications on contracts for steel bars have also picked up since last week, but shafting is still somewhat weak, a fact which is said to result from the makers of shafting having considerable raw material obtained at the 1.10c., Pittsburgh, basis. There is an inquiry in the market for 2500 tons of reinforcing bars for the Jerome Park filter, New York, but the delivery will probably be somewhat along in 1913, and it is believed that the extras for twisting asked for some months will in this job also be exacted in addition to the base price of 1.40c. Steel bars remain nominally 1.40c., Pittsburgh, or 1.56c. minimum, New York, mill shipments, for delivery at the convenience of makers, and from store, 2.05c. Refined iron bars are 1.70c. to 1.75c., New York, and from store, 2.05c.

Cast Iron Pipe.—The market is quiet. No new public lettings of consequence are announced in this immediate vicinity. Private buying is fair. Carload lots of 6 in. are quoted at $25 to $27, per net ton at tidewater, according to condition of maker's order books.

Ferroalloys.—The market has continued very quiet at unchanged quotations for 80 per cent. ferromanganese, the demand the past week not having been sufficient to test prices, which are $65, Baltimore, for second

quarter and last half delivery, up to $70 for early delivery and $71 to $75 for spot. Conditions are similar in 50 per cent. ferrosilicon, which is quoted at $75, Pittsburgh, for carloads; $74 for 100 tons and $73 for 600 tons or over.

Old Material.—Quiet conditions prevail in almost all classes of old material. Old car wheels are in exceptionally good demand, with prices strong. Dealers' quotations are nominally as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting	$12.00 to $12.50
Heavy melting steel scrap	12.00 to 12.50
Relaying rails	22.50 to 23.00
Rerolling rails	14.00 to 14.50
Iron car axles	24.00 to 25.00
Old steel car axles	16.00 to 16.50
No. 1 railroad wrought	13.75 to 14.25
Wrought iron track scrap	13.00 to 13.50
No. 1 yard wrought, long	12.50 to 13.00
No. 1 yard wrought, short	12.00 to 12.50
Light iron	5.25 to 5.75
Cast borings	8.25 to 8.75
Wrought turnings	8.50 to 9.00
Wrought pipe	10.75 to 11.25
Old car wheels	15.50 to 16.00
No. 1 heavy cast, broken up	12.00 to 12.50
Stove plate	9.75 to 10.00
Locomotive grate bars	9.00 to 9.50
Malleable cast	11.50 to 12.00

Metal Market

NEW YORK, December 24, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
Dec.	Lake.	Electro-lytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
19	17.62½	17.50	49.85	4.30	4.15	7.30	7.15
20	17.55	17.50	49.90	4.27½	4.12½	7.30	7.15
21	17.55	17.50	.....	4.27½	4.12½	7.30	7.15
23	17.62½	17.50	50.25	4.27½	4.12½	7.30	7.15
24	17.62½	17.50	50.15	4.27½	4.12½	7.30	7.15

Copper is firm, with electrolytic higher after fair activity. Tin is quiet, with 50c. exceeded again. Lead is lower and inquiries are reviving. Spelter is dull and easy. Antimony continues unsettled. The London Metal Exchange closes to-day until Friday next.

New York

Copper.—A better demand has developed and a fair amount of business has been done, both in Lake and electrolytic. The former sold as low as 17.50c. to 17.55c., but the quantity at that price was soon exhausted and to-day more cannot be had at those figures, the price now being 17.62½c. Of electrolytic a quantity not exceedingly large but still very good was sold, the bulk of the business being on the basis of 17.50c., cash, New York, the present price, and all for January or February delivery. The situation in March copper is softer, offerings having been made down to 17.30c., cash, New York. As for the selling end of the metal most of the sellers are comfortably sold up for January and now are devoting their attention chiefly to February and a good buying movement is expected to set in shortly. The price in London to-day is £75, 17s., 6d. for spot and £77 for futures. The exports this month were 18,834 tons.

Pig Tin.—The price is again over 50c., the quotation to-day being 50.15c. On Friday of last week tin transactions, which were principally between dealers, aggregated a relatively good figure, not less than 200 tons and possibly as much as 300 tons having changed hands around 49.90c. for both early and late delivery. Thursday and Saturday of last week and Monday of this week were quiet and not much is expected to develop to-day The price of tin in London to-day is £227, 10s. for spot and £228 for futures. The arrivals this month total 2213 tons and there is afloat 2231 tons. On Thursday last the announcement was made that the 1913 Banca sales in Holland will amount to about 14,880 tons, or about 2480 tons for each of the six bimonthly sales, which is a reduction of 200 tons each as compared with this year.

Tin Plates.—The situation locally is unchanged except that demand has been lighter as might be expected at this season.

Lead.—Consumers are taking more interest in this metal, but while fair sized inquiries have been more in evidence little buying has so far resulted. Prices are lower, offerings having been made very generally at 4.12½c., St. Louis, or 4.27½c., New York.

Spelter.—The market retains its dullness and is easy at 7.15c., St. Louis, and 7.30c., New York.

Antimony.—This metal is in a rather unsettled state because the market is not yet free of speculative influences. Sales are still being made below import prices, at 9.87½c. for Cookson's, 9.50c. for Hallett's and 9c. for Chinese and Hungarian grades. The price cutting is in the better grades, the import prices being 10.50c. for Cookson's, 9.75c. for Hallett's and 9c. for Chinese and Hungarian.

Old Metals.—Inquiry has increased, thus showing more interest among consumers. Dealers' selling prices are unchanged, being nominally as follows:

	Cents per lb.
Copper, heavy and crucible	16.75 to 17.00
Copper, heavy and wire	15.75 to 16.00
Copper, light and bottoms	14.50 to 14.75
Brass, heavy	10.25 to 10.50
Brass, light	8.25 to 8.50
Heavy machine composition	13.75 to 14.00
Clean brass turnings	9.50 to 9.75
Composition turnings	12.00 to 12.50
Lead, heavy	4.25
Lead, tea	4.00
Zinc, scrap	6.00

Chicago

DECEMBER 23.—Copper and tin prices have been firmer, with tendencies toward fractional advances. Lead and spelter continue to be nominally firm, but shading of regular quotations is not lacking for desirable business. We quote as follows: Casting copper, 17.62½c.; Lake, 17.75c. to 18c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 50.75c.; small lots, 52.50c.; lead, desilverized, 4.35c. for 50-ton lots; corroding, 4.00c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 7.30c. to 7.40c.; Cookson's antimony, 11.25c., and other grades, 10.50c. in small lots; sheet zinc is $9, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 15.50c.; copper bottoms, 14c.; copper clips, 15c.; red brass, 12.75c.; yellow brass, 10c.; lead pipe, 4c.; zinc, 5.50c.; pewter, No. 1, 33c.; tinfoil, 39c.; block tin pipe, 45c.

St. Louis

DECEMBER 23.—The market has been quiet and somewhat easier. Lead is quoted at 4.12½c. and spelter at 7.15c., both being the offering figures. The best bid on lead was 4.10c. Tin stands at 50.20c. to 50.55c.; Lake copper, 17.97½c. to 18.22½c.; electrolytic copper, 17.87½c. to 18.12½c.; Cookson's antimony, 10.85c. The Joplin ore market presents no striking features as to either demand or sales. The basis price for 60 per cent. metallic zinc ore ranged from $56 to $57 downward, with the top price for the choicest at $59 to $60 per ton. In calamine there was a fair demand at $28 to $32 for 40 per cent., with the best at $37 to $38. Lead ore was very quiet around $52 to $54. On miscellaneous scrap we quote as follows: Light brass, 6.50c.; heavy brass and light copper, 10.50c.; heavy copper and copper wire, 13c.; pewter, 25c.; tinfoil, 32c.; zinc, 4c.; lead, 3.50c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, December 24, 1912.

The stock market underwent some recovery from the depression reported in last week's issue. European conditions improved decidedly, the money market loosened up considerably and financial influences generally had a more encouraging aspect, but on Monday some recession occurred. The range of prices on active iron and industrial stocks from Wednesday of last week to Monday of this wek was as follows:

Am. Can, com.	27⅛- 32⅛	Pittsburgh St., pref.	100
Am. Can, pref.	113 -117	Pressed Steel, com.	33¾- 35¼
Am. Car & Fdy., com.	53 - 56	Railway Spring, com.	32½- 35½
Am. Loco., com.	40⅝- 43½	Republic, com.	25¼- 27¼
Am. Loco., pref.	106½	Republic, pref.	84½- 85⅞
Am. Steel Foundries	35	Rumely Co., com.	89¾- 91½
Bald. Loco., com.	49½- 52	Rumely Co., pref.	100½
Bald. Loco., pref.	103 -104⅜	Sloss, pref.	97¾- 99¾
Beth. Steel, com.	33½- 37½	Pipe, com.	17½
Beth. Steel, pref.	64 - 67	Pipe, pref.	57½- 58¾
Case (J. I.) Co., pref.	99⅜	U. S. Steel, com.	64¾- 69¼
Colorado Fuel	32 - 35	U. S. Steel, pref.	109¾-110¼
Deere & Co., pref.	99⅜- 99⅞	Va. I. C. & Coke	53½- 58
Emer.-Brant, pref.	98½-100	Westinghouse Elec.	76½- 80¾
General Electric	181 -185½	Am. Ship, com.	55 - 55½
Gr. N. Ore Cert.	41 -42¾	Chic. Pneu. Tool	50 - 52
Int. Harv., com.	109 -114	Cambria Steel	48 - 50¼
Int. Harv., pref.	114 -115	Lake Sup. Corp.	26¾- 30½
Int. Pump, com.	19 - 19½	Pa. Steel, pref.	93½- 94
Int. Pump, pref.	70½- 73	Warwick	10½
Lackawanna Steel	47½- 48	Crucible Steel, com.	16¾- 17¼
Nat. En. & St., com.	18 - 18¼	Crucible Steel, pref.	93 - 93½
Nat. En. & St., pref.	91½		

Dividends Declared

The E. W. Bliss Company, regular quarterly 2 per cent. on the preferred stock, payable January 1.

The Western Electric Company, regular quarterly, 2 per cent. and an extra of 2 per cent., both payable December 31.

The Sharon Steel Hoop Company, regular quarterly, 1¾ per cent., payable January 1.

The United Shoe Machinery Company, regular quarterly, 2 per cent. on the common and 1½ per cent. on the preferred stock, both payable January 4.

The American Locomotive Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 21.

The Chicago Railway Equipment Company, regular quarterly, 1¾ per cent., payable December 31.

The Union Typewriter Company, regular quarterly, 1¾ per cent. on the first preferred and 2 per cent. on the second preferred stocks, both payable January 1.

American Seeding Machine Company, regular quarterly, 1½ per cent. on the preferred and 1 per cent. on the common stock, payable January 15.

American Shipbuilding Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 15.

The Consolidated Car Heating Company, 2½ per cent., payable January 15.

The Dominion Steel Corporation, Ltd., regular quarterly, 1 per cent. on the common stock, payable January 1.

Manning, Maxwell & Moore, Inc., regular quarterly, 1½ per cent., payable December 24.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 2.

The Standard Screw Company, 3 per cent. on the preferred stock, and 2 per cent. on the common stock, payable January 1.

The Torrington Company, 3½ per cent. on the preferred stock, payable January 2.

The Riehle Brothers Testing Machine Company, Philadelphia, annual, 6 per cent.

The Westinghouse Electric & Mfg. Company, regular quarterly, 1¾ per cent. on the preferred and 1 per cent. on the common stock. The preferred dividend is payable January 15 and the common January 30.

Personal

R. T. Hodgkins, who recently resigned as manager of the chain hoist department of the Yale & Towne Mfg. Company, 9 Murray street, New York, will join the forces of the Studebaker Corporation.

W. P. Johnson, recently the European representative of the International Harvester Company, has been elected a vice-president of H. M. Byllesby & Co., engineers, Insurance Exchange Building, Chicago. Mr. Johnson joined Byllesby & Co. in the capacity of New York representative, having charge of the New York office.

W. C. Rogers has joined the sales force of the Reliance Coal & Coke Company, Cincinnati, and will have charge of the city sales department.

Arthur Appleton, 52 Broadway, New York City, has been engaged to represent the Toledo Bridge & Crane Company, Toledo, Ohio, in New York territory. He succeeds H. L. Drullard.

John Taggart has been made assistant master mechanic at the Homestead steel works of the Carnegie Steel Company at Homestead, Pa.

R. Daae has withdrawn from the Schlieper-Daae Engineering Company, Magee Building, Pittsburgh. J. E. Schlieper will continue the business under the name of the Schlieper Engineering Company.

The Alberger Company, Newburgh, N. Y., has constructed a pump which will have a capacity of 100,000 gal. of water daily. Its inside diameter is 48 in. The case is over 13 ft. in hight and weighs 19,500 lbs. A notable instance of the adaptability and capacity of the modern machine tool is found in the standard Rochester boring machine which was used to bore, mill, tap, drill, groove and plane the great casing.

Announcement has been made by Virginia railroads of an advance of 25c. a ton in the freight rate on pig iron to practically all points within the State. To Lamberts Point, Va., on shipments to coastwise points by barge, sailing vessel, etc., the rate has been advanced 15c. a ton. The new rates become effective January 1, 1913.

Pittsburgh and Vicinity Business Notes

Ella furnace of Pickands, Mather & Co., at West Middlesex, Pa., has been blown in after being idle for more than two years.

The threatened strike among the trainmen employed by the Cambria Steel Company at Johnstown, Pa., has been settled, some slight concessions having been made to the men.

The report that the Jones & Laughlin Steel Company will build a steel plant at El Paso, Texas, to cost $10,000,000 is officially denied.

The Carnegie Steel Company has closed a contract with the General Electric Company for one 5475-kva. high-pressure condensing steam turbine, for installation in the Edgar Thomson plant at Braddock, Pa. The same electric company is building a 4500-kva. mixed-pressure condensing turbine for the Homestead plant at Munhall, Pa. Both engines are of 25 cycle and have a pressure of 6600 volts.

The Hughes Nut-Lock Corporation, Lynchburg, Va., has placed an order with Tate-Jones & Co., Inc., Pittsburgh, Pa., for its furnace requirements for heat treating. Other very recent orders for heat treating furnaces have been received from the Minnesota State Prison, Boston Saw & Tool Company and Firth Sterling Steel Company.

The Elliott-Blair Steel Company, New Castle, Pa., maker of fine cold-rolled strip steel for all kinds of blanking, stamping and drawing, is building an addition to its plant, consisting of a steel building, 50 x 150 ft. All the necessary equipment has been bought.

The McClintic-Marshall Construction Company is installing at its works at Rankin, Pa., a Snow horizontal gas engine, direct-connected to a tandem compound Laidlaw-Dunn-Gordon compressor with a capacity of 2000 cu. ft. of air per minute at 100 lb. pressure.

The Marshall Foundry Company, Pittsburgh, has recently taken contracts for about 1500 tons of ingot molds per month for delivery over all of next year.

John Hulst, chief engineer of the Carnegie Steel Company, is taking estimates on the installation of mechanical stokers to operate the power plant at the Lower Union mills, Pittsburgh. The installation calls for approximately 3000 hp. to operate four Sterling, four Babcock & Wilcox and one Erie City water-tube boilers.

Part of the plant of the Page Woven Wire Fence Company is to be removed from Adrian, Mich., to Monessen, Pa., where the company operates an open-hearth steel plant and wire rod, wire and wire nail mills. It has been steadily concentrating its business at Monessen on account of the advantages of that place for receiving raw materials and making shipments of finished products.

Samuel Trethewey & Co., Ltd., Pittsburgh, manufacturers of forging hammers, knives, shears and tool steel specialties, have installed a new steam boiler for use in testing steam forging and tilting hammers. They have completed a shipment of ten 500 to 800 lb. tilting hammers and are working on an order for several 1200-lb. forging hammers.

A New Safety Set Screw

The Goodwin Hollow Set Screw Company, Waterbury, Conn., is manufacturing a new safety set screw which has as a characteristic that it may be turned by a screw driver as well as with its key wrench. The recessed end is slotted at the angles of its surfaces so that when a screw is set up with a wrench there is no give, the wrench corners engaging the slots, which perform the same function when a screw driver is employed.

The Pittsburgh Iron Ore Company, miner and shipper of Lake Superior iron ores, has ordered of the Ruggles-Coles Engineering Company, New York City, two class A dryers for drying ore at the Brunt mines near Virginia, Minn. The dryers will each be 90 in. diameter by [illegible] ft. long, and will have a capacity for drying 23 tons of ore per hour, reducing the moisture from 18 per cent. to 6 per cent. They will be, it is claimed, the largest ore dryers ever built.

Experiments with Open Hearth Regenerators

Valuable Information Secured by the Use of Pressure and Temperature Meters—Fans to Add to Air Supply

In the issues of Stahl und Eisen for October 4 and November 7 is a very interesting paper on open hearth regenerators by E. Juon, steel works superintendent of the Donez-Jurjewka plant, South Russia. It is abstracted below.

The chief duty of the regenerator, as the name implies, is to accumulate heat from the waste gases in the bricks of the checker work. This is not all, however, for above everything else it is part of the system through which the gases are led to or from the hearth, and must

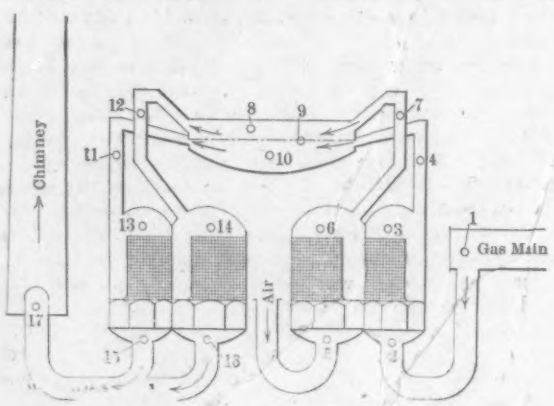


Fig. 1.—Position for Taking Pressure Records

allow free passage to these gases. These requirements are altogether separate and conflicting. Every furnace manager is taught early in his career that the heat efficiency of his checker work will be greater the smaller the spaces between the bricks, and the more tortuous the passages between them. Checker work with bricks laid in complicated ways has been tried many times, but without success, because such an arrangement greatly hinders the passage of the gases. In any discussion of regenerators the uptakes which lead the gas and air to the ports, and through them to the furnace, must also be considered.

Details of the Tests

Below are collected some observations with reference to these requirements. In the course of the furnace run the conditions affecting the regenerators change very considerably. Their efficiency continually grows less until, if no other reason intervenes, the furnace has to be shut down.

The tests carried out at the open hearth plant of the Donez-Jurjewka Company covered a considerable period of time. The plant consisted of five furnaces of 30 to 35 tons capacity, and one furnace of 45 to 50 tons. The output of ingots in 1911 was over 220,000 metric tons (2204.6 lb.). A seventh furnace of 60 tons capacity was started in March, 1912. All the furnaces work exclusively with a liquid charge. Their capacity was gradually increased from 22 to 35 tons without the regenerators being made correspondingly larger. The latter are therefore heavily overloaded so that they require continued careful attention. A systematic investigation must be carried out along two lines; namely, the temperature and the pressure conditions, or the pressure in different parts of the furnace system. The temperatures were carefully taken many times in the day in each of the positions chosen, but unfortunately no instruments were available by which an uninterrupted continuous record could be obtained. The Wanner pyrometer was used, and some special red glasses were previously carefully standardized by the pyrometer.

The Taking of Pressure Records

The pressures were taken by the positive and negative pressure meters manufactured by the Hydro apparatus company of Düsseldorf.* They give a continuous record and five of them were available. The smallest change in pressure is indicated, so that the records serve to show the whole operation of the particular furnace under investigation. Not only the reversals of gas and air, but the work of the gas producers, such as poking and cleaning, are clearly indicated, as well as any change in the valves, the charging, the reaction of the bath in the furnace, and the tapping of the heat. The meters were at first installed as a control apparatus, for which they are well fitted. Little consideration was given originally to the actual pressure values, as no positive connection could be determined between them and the furnace operation. Under normal conditions the daily pressure records taken at the same place in the furnace system look almost alike. Over 3000 such records were taken during the last two years and carefully compared. A record showing abnormal conditions can now be separated from a normal one at the first glance. Records of normal conditions are used below un-

*These instruments are now supplied in this country by a Pittsburgh house.

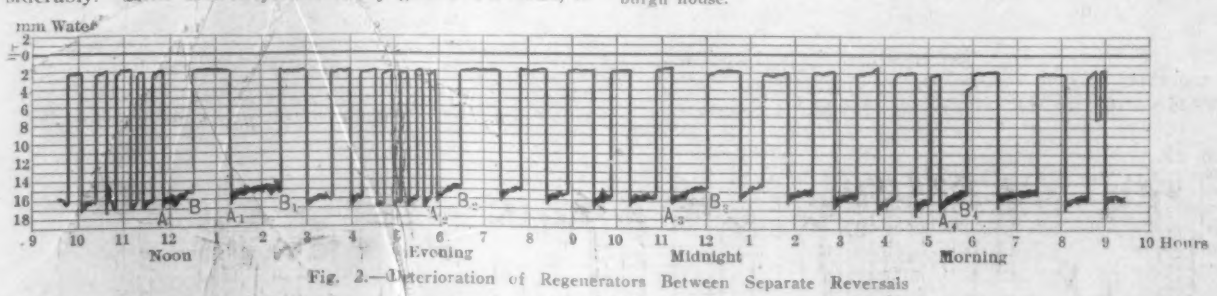


Fig. 2.—Deterioration of Regenerators Between Separate Reversals

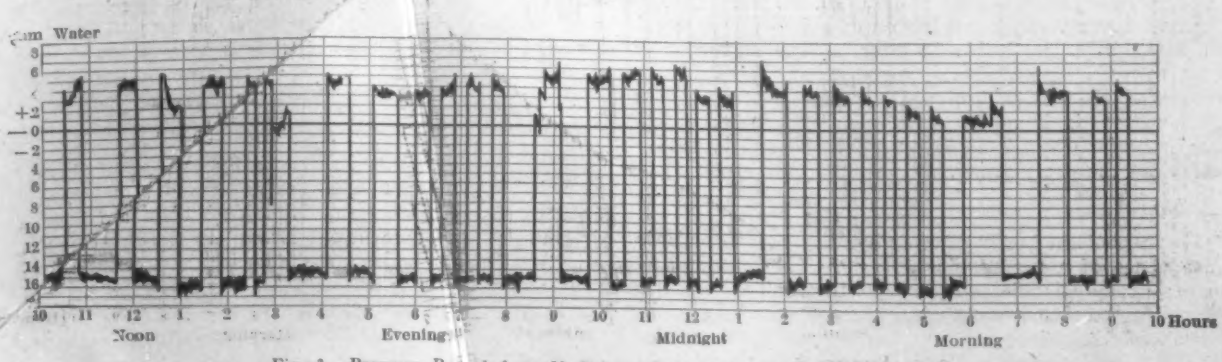


Fig. 3.—Pressure Record from Underneath Gas Regenerator, After Heat 156

less otherwise stated. By such conditions are meant those obtaining during the period between the 20th and 500th heat, with a temperature of about 1200 deg. C. in the upper part of the regenerators, with correct gas producer operation and wide open valves.

Table I shows the positions where the pressure records were taken. Those in the hearth could not be measured by the instruments, and an ordinary U tube was used. Fig. 1 shows the positions diagrammatically. The normal values for pressure and temperature are given in Table I, together with the density of the gases calculated from their analyses and the area of cross-section of the particular places. Some of the pressure records given in the original paper are reproduced below.

Table 1.—Positions of Pressure Meters, with Average Pressure and Temperature

No.	Positions.	Average pressure mm. water.	Aver. temp. deg. C.	Density of gases, deg. C. and 760 mm. Air=1.	Area of cross section, sq. in.
	Gas				
1	In the gas main	+15	600	0.90 to 0.94	1209
2	Gas flue, under gas regenerator	(+2 to +11) +5	(650 to 750) 700	0.92	1395
3	Top of the gas regenerator		(1100 to 1300)	0.92	7750
4	Uptake above gas regenerator	+4 (+5 to +10) +7	1200 (1200 to 1300) 1250	0.92	465
	Air				
5	Air flue under air regenerator	−1	(400 to 700) 550	1.00	1937
6	Top of the air regenerator	±0	(1100 to 1350) 1225	1.00	9610
7	Vertical uptake above air regenerator hearth.	+3	(1250 to 1400) 1300	1.66	465
8	Above center line	Small pressure	Up to 1800		
9	Center line	±0	Up to 1800		
10	Below center line	Small pressure	Up to 1800		
	Waste Gases				
11	Vertical gas downtake	(−2 to −3) −3	1700	1.01 to 1.05	465
12	Vertical air downtake	+1.5	1700	1.03	465
13	Top of gas regenerator	−14 to −15	1600	1.03	7750
14	Top of air regenerator	−14 to −15	1600	1.03	9610
15	Below the gas regenerator	−19	750	1.03	1395
16	Below the air regenerator	−18	700	1.03	1937
17	Base of chimney stack	−33	600	1.03	1550

NOTE:—The pressures are given in mm. water to agree with the records reproduced (1 mm. water=0.0394 in.)

The records for the various positions are characteristic and allow the real average values to be obtained for the separate working periods, which is impossible with the ordinary methods of pressure measurement. The main purpose of these records is to give a clear idea as to whether everything is working properly; if not, the reason must be indicated so that the proper remedy can be applied.

The work of the regenerators deteriorates each hour in the short periods between the reversals of gas and air. This is shown, for instance, in Fig. 2, which gives the record taken at the lower part of the air regenerator. The exhaustion is the greatest immediately after reversal, and gradually decreases until the next reversal. This is not only the case when directly connected to the stack, but also when connected to the furnace. However, the change in the latter period are much smaller, about 0.2 mm. water between reversals, while in the former case they are about 2 mm. This is clearly shown at A B, A_1 B_1, etc., in Fig. 2. These regular periodic changes naturally depend on the changes in temperature, and are always more noticeable toward the beginning of the furnace run than toward the end. It appears as if they were due to the checker work being clean and not covered with slag, and so being a better heat conductor. Fig. 2 was taken at the beginning of the run, heats 30 to 34.

Conditions Affecting Movement of Gases

Two conditions affect the movement of the gases in the regenerators. The first is the tendency to rise which increases with increasing temperature, and the second is the frictional resistance of the brick work which also increases as the temperature rises. If the regenerators are directly connected with the stack then a constant increase in temperature takes place between reversals. This brings about increased resistance and also greatly increases the rising tendency of the waste gases, which in this case acts as resistance. The draft, therefore, is decreased by the sum of these two resistances. If the checkers are connected to the hearth then a continuous decrease in temperature takes place. The internal resistance slowly grows less, and also the tendency to rise, which in this case works positively. The draft, therefore, only decreases a very little, according to the continuous difference between these two forces. These conditions are clearly seen in the pressure records.

The records taken at the base of the chimney also show the changes due to temperature differences between reversals. They also show other periodic changes occurring at longer time intervals, namely, the lowest draft pressures which are reached from 1½ to 2 hours after the tapping time, and during charging. A record taken at the same time in the air regenerator shows that this period also corresponds to that of greatest time intervals between reversals.

How Symptoms of Deterioration Show

The slowly increasing deterioration of the checkers during the furnace run is the most fatal to the furnace. The burning back of the ports is often the cause of shutting down the furnace. Attempts are now being made to obviate this by the use of water cooled ports, changeable ports, and other special arrangements. Even with completely good ports, however, there finally comes a time when the furnace shows clear signs of age. An ordinary furnace working with cold charges should run for somewhat more than 1000 heats. The life of a large furnace with liquid charges is shorter. At Donez-Jurjewka various operating troubles become evident after 500 heats, and more than 750 is only reached in exceptional cases. The symptoms of weakness due to age are an increase in coal consumption, then the flame development in the hearth be-

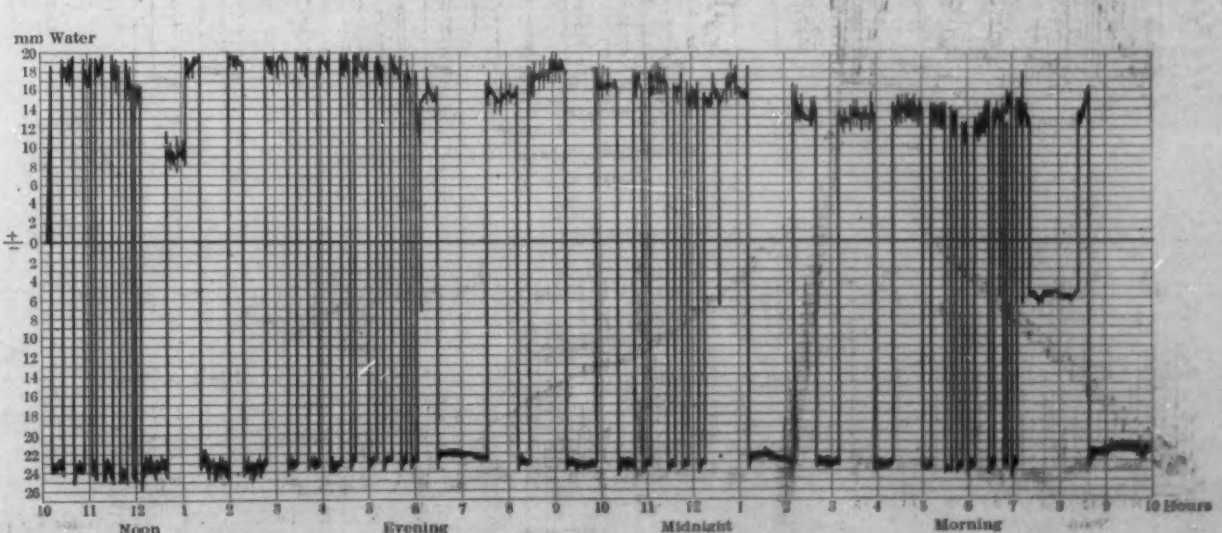


Fig. 4.—Pressure Record from Same Position as Fig. 3, After Heat 607.

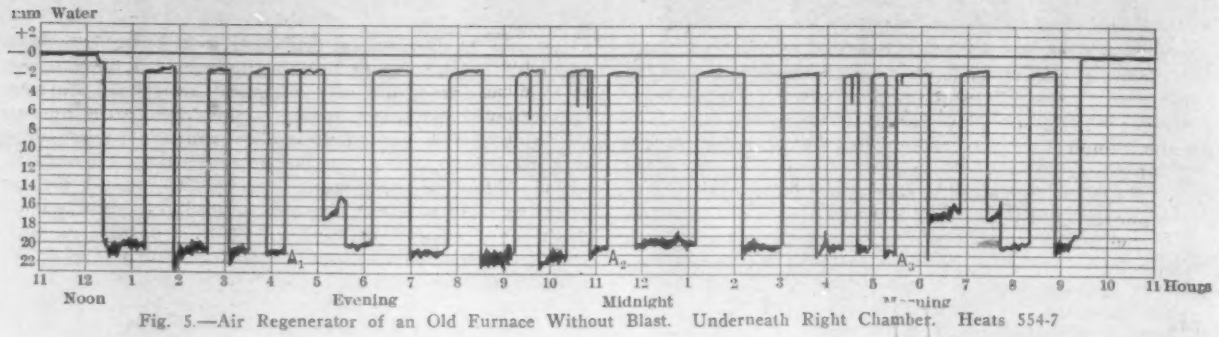


Fig. 5.—Air Regenerator of an Old Furnace Without Blast. Underneath Right Chamber. Heats 554-7

comes bad, metal is left around the edges of the bath after tapping, there is not air enough, the checkers are not uniformly hot, the time of the heat is very long, the heats are dead and cold, notwithstanding the increased coal consumption, etc.

All these appearances are due, in the first place, to bad working of the regenerators as part of the furnace system. If two pressure records taken in the regenerators at the beginning and end of a furnace run are compared, the difference is seen at once. (Figs. 3 and 4, taken underneath the checkerwork.) The draft when connected with the stack, and the pressure when connected with the furnace have increased from 1½ to 5 times. The case in the upper part of the regenerators is exactly the opposite. There the records show that with an old furnace the pressure on the ingoing end and the draft on the outgoing end have cannot be greatly different because the size of the chambers and the temperatures are not greatly altered during the furnace run. This increased frictional resistance is easily explained by the accumulation of dust in the checker work, and the slagging of the bricks. The value of the pressure records at this state of the furnace run is that through a comparison of those taken above and below the regenerators the amount of resistance which they offer can be determined, and also the amount of slagging in each separate chamber.

The first one to see the bad effects of this increased resistance is the first helper or melter. The gas enters the furnace without force and a good flame cannot be produced. He then complains of lack of gas or bad gas. This makes the producer man work harder, he pokes with increased energy, uses more coal, and where it is possible

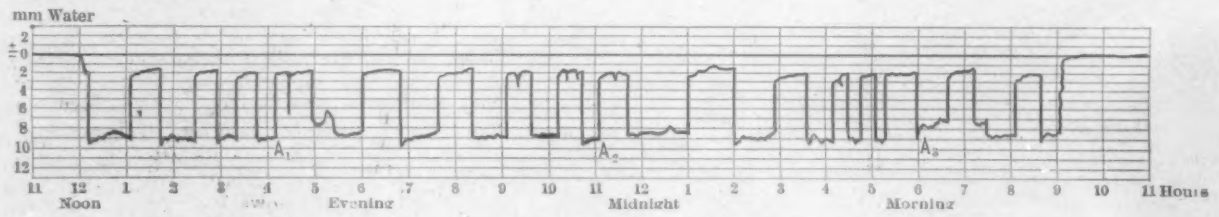


Fig. 6.—Air Regenerator of an Old Furnace Without Blast. Above Right Chamber. Heats 554-7

decreased compared with conditions at the beginning of the furnace run. The records show that while the pressure in the lower part of the regenerators has increased from ¾ mm. to 15/17 mm. in the upper part it has fallen from 3 mm. to 0. This is the most striking expression of the influence of the age of the furnace on the movement of the gases through the furnace system, as shown by the pressure records.

Measuring Resistance to Gases

If other positions are investigated in connection with the age of the furnace, it is found that all in front of the checkers show striking increase in pressure while all behind show a decrease. Briefly it is clear that it is the regenerators which have suffered the greatest change due to age. The resistance offered by them to the passage of the gases has been strikingly increased. This can only be based on the two conditions mentioned before, and it is evident that the increase in the frictional resistance is the chief cause since the tendency of the gases to rise increases the blast on the producer. At first this helps, for the increased pressure at which the gas enters the regenerators equalizes the increased resistance; but it is a very expensive way of improving the flame development. As soon as the pressure records, with otherwise normal conditions, give evidence of slagging in the regenerators, then the coal consumption begins to increase, both per unit of production and of time. This is shown in Table 2, giving the fuel consumption at periods corresponding to Figs. 3 and 4.

It should be particularly emphasized that these two working periods were not chosen specially for comparison, but that such periods are to be found in every furnace run.

Although the decrease in the working capacity of the gas regenerators can be partly remedied by an increase in the gas pressure, this does not apply to the air, so that the same appearance in the air regenerators is much more harmful for the furnace. At Donez-Jurjewka the latter are usually kept 50 to 100 deg. C. hotter than those for the gas. The uptakes are continued higher above the

Table 2—Age of Furnace and Coal Consumption

Date, 1910.	No. of heat in series.	No. of heats.	Average time of heat, hours (see note).	Production of ingots, tons.	Coal consumption per day, tons.	Coal consumption per 100 tons ingots, daily tons.	Coal consumption per 100 tons ingots, average tons.	Coal consumption per production hour (see note), daily tons.	Coal consumption per production hour (see note), average tons.	Average gas pressure in regenerators, lower part, mm.	Average gas pressure in regenerators, upper part, water.
June 19	156-59	4	4.7	130.5	26.6	20.3		1.11		+6	+5
20	160-64	5	4.5	165.0	29.1	17.6		1.21		+5	+5
21	165-68	4	5.0	135.0	28.1	20.8	19.07	1.17	1.14	+4	+4
22	169-72	4	4.7	133.3	26.8	20.0		1.11		+4	+4
23	173-76	4	4.9	141.5	26.6	18.8		1.11		+5	+4
24	177-81	5	4.8	160.0	27.9	17.4		1.17		+4	+3
Oct. 23	600-02	3	5.6	96.6	30.0	31.0		1.25		+18	0
24	603-06	4	5.7	131.6	30.6	23.2		1.27		+18	+1
25	607-10	4	5.8	135.0	29.6	21.9	24.61	1.23	1.26	+17	0
26	611-13	3	5.8	102.5	28.3	27.6		1.18		+16	0
27	614-17	4	5.7	132.9	30.8	23.1		1.29		+17	0
28	618-21	4	5.7	136.6	31.6	23.1		1.32		+16	+1

NOTES.—45 minutes is allowed between heats for making up bottom, etc. This is not included in the time of heat. The day is calculated as having 24 production hours.

checkers and the air port as a rule is above the gas port. All these make the tendency to rise and the resistance offered more favorable than in the case of the gas. Notwithstanding, the time comes when the passage of air is greatly hindered for the same reasons mentioned in the case of the gas. This causes a lack of air in the furnace. Then if the gas pressure is purposely increased there is very quickly incomplete combustion, unless the air supply was previously very plentiful (which naturally is bad in itself) and this causes the furnace to work cold and markedly reduces the output.

Analyses Showing Lack of Air

An analysis of the waste gases will generally prove a lack of air, but only carefully taken average results must be used. Such tests taken from a series of analyses are given in Table 3, the composition of the producer gas being approximately the same during the two periods. The test samples must be taken with the furnace doors properly closed, otherwise much air is drawn in and the analyses will be incorrect. How harmful an excess of air drawn through the doors is for the furnace need not be mentioned. With old furnaces the combustion is often so incomplete that at night it is evidence by the flames from the furnace stacks.

Table 3.—Chimney Gas Analysis

	Date 1910			
	June 21-22	June 26-27	October 25-26	October 27-30
Age of furnace by heats.....	165-172	185-193	607-613	625-631
Per cent by Vol. CO_2	10.2	9.1	16.4	14.2
O	7.7	8.4	3.9	3.1
CO	...	...	0.2	0.4
N	82.1	82.5	79.5	82.3
Excess coefficient for air: $\text{Excess} = \frac{N}{N - \frac{79}{21}O}$	1.54	1.62	1.22	1.16

Hand in hand with the lack of air, which moreover cannot always be clearly proved and is often unjustly blamed for many things, there is ununiformity in the heating of the air regenerators. At Donez-Jurjewka the furnaces are built on the eight regenerator system, and each of the chambers was carefully investigated. In Table 4 a remarkable case of bad heat distribution is given. The temperatures were measured in the upper third of the regenerators on heat 643 of furnace No. 3, one day before it was shut down.

Table 4.—Comparison of Regenerator Temperatures in Old Furnace Just Before Shut Down

Positions	6 A. M. Gas from left to right, deg. C.	12 M. Gas from right to left, deg. C.	2:30 P. M. Furnace is charged, deg. C.	8 P. M. Before tapping, deg. C.
Front gas regenerator right...	1105	1080	1005	1096
Back gas regenerator right....	1190	1160	1105	1177
Front gas regenerator left....	1043	1080	975	1055
Back gas regenerator left.....	1055	1080	950	1055
Front air regenerator right....	1100	1190	1190	1266
Back air regenerator right....	1009	975	900	900
Front air regenerator left.....	1080	1096	1055	1080
Back air regenerator left.....	1055	1055	1080	1096

In such cases changing the valves does not help any more. The whole behavior of the air checkers shows such irregularities as can only be explained by a complete slagging of a certain part of the checker work. It appears, for example, that the cooling of certain parts increases after reversing instead of increasing. While an outside gas pressure assists the passage of gas through the checker work and uptakes, the air regenerator has no such outside assistance at its disposal, the only help being the rising tendency of the gas in the chambers and uptakes above. If the pressure records of the air and gas regenerators are compared, there is seen to be a difference. In the case of the gas it is only after the stream has passed along the whole way and entered the hearth that the pressure drops to that of the atmosphere. In the case of the air, however, the first equalization with this pressure is reached in the upper part of the regenerators. A positive pressure is then produced in the vertical uptakes, and in the hearth it is again equalized.

Good Results with Blast from Fans

The air supply system may be compared to two pumps. One is signified by the checker work of the regenerators. It pulls the air from outside and delivers it under the roof of the regenerators at the original pressure. It could not proceed further unless it came at that point under the influence of the second pump that is situated in the uptakes and supplies the air direct to the hearth. In each space designated as a pump the positive force consists of the tendency of the heated air to rise, the negative of the frictional resistance. As the latter constantly increases with the age of the furnace the time comes when the checkers are in such condition that the former cannot overcome it. The influence of the uptake then tries to bring about a vacuum in the upper part of the regenerator, finds this difficult, and the amount of air supplied to the hearth is greatly decreased. These conditions then lead to incomplete combustion. Just as we have the possibility in a similar case of increasing the outside pressure and forcing gas through the gas regenerators, so there is here the same possibility of forcing air through the chambers by outside pressure. This has been pointed out by Dichmann and others.

It was thought, therefore, that the time was ripe to try this at Donez-Jurjewka, using as a basis the many pressure records, and experiment with an old badly running furnace. Accordingly a fan was provided and tried out at the proper time. The results exceeded expectations. The fan is 635 mm. (25 in.) diameter and driven by a 3.5-hp. motor at a velocity of 500 r.p.m. The amount of air furnished is 266 cu. m. (9182 cu. ft.) per second, with a pressure of 25 mm. of water. The driving motor can be switched on and off by the melter from the working floor. As the speed of the motor cannot be changed, a simple valve arrangement is used, so that the excess air can escape and only the amount needed be used. After the proper conditions of working had been determined by means of analysis, pressure records and temperatures, the blast was available, and is now always used at the end of the ordinary furnace run, if there is proof of obstruction in the regenerators. Usually the blast is started after the heat is charged and not changed until shortly before tapping. The first day, even with a mild blast, it generally makes the flame blow strongly out of the doors. This, however, soon stops in a most astonishing way. It appears as if the increased pressure of the waste gases, which cannot at first penetrate the checker work, gradually breaks its way through. Perhaps the increase in temperature plays a part and melts down the solid slag deposits resting on the upper parts of the packing.

The following example may be given, but it should be emphasized that the given data ought not to be generalized too freely. Furnace No. 4 after heat 550 was ready to be shut down, but as the blast was being used on another

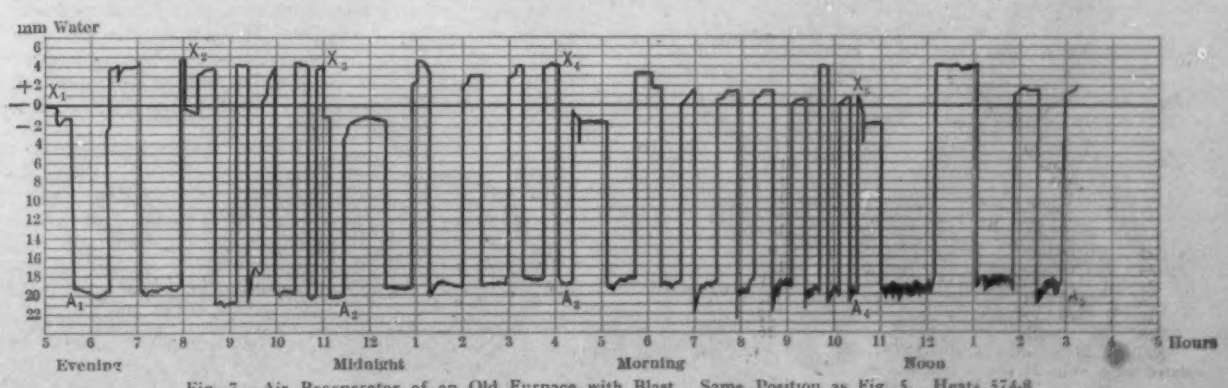


Fig. 7.—Air Regenerator of an Old Furnace with Blast. Same Position as Fig. 5. Heats 574-8

furnace it could not be helped right away. However, as it was evident that it would have to be shut down unless something was done, it was determined to try the cure. The results are given in Table 5.

Table 5.—Change in Output Brought About by the Use of Blast

Date, 1911	No. of heat in series	Time of heat, hours	Weight of heat, tons	Hourly Output Per heat, tons	Aver. tons	Remarks
Dec. 12	544	5.50	28.8	5.23		
Dec. 12	545	6.25	32.6	5.21		
Dec. 12	546	5.75	27.5	4.78		
Dec. 13	547	5.75	27.4	4.76		
Dec. 13	548	5.50	28.5	5.19		
Dec. 13	549	7.75	35.2	4.55		Dead heat
Dec. 14	550	6.75	30.5	4.51		Dead heat
Dec. 14	551	6.00	31.8	5.03		
Dec. 14	552	7.25	30.2	4.17	4.66	
Dec. 15	553	7.25	30.0	4.14		Dead heat
Dec. 15	554	5.25	32.5	6.20		Dead heat
Dec. 15	555	6.25	28.5	4.56		Dead heat
Dec. 15	556	6.00	27.0	4.50		Dead heat
Dec. 16	557	8.25	35.4	4.30		Cold heat
Dec. 16	558	7.00	30.8	4.40		Cold heat
Dec. 16	559	8.25	31.0	3.77		Cold heat
Dec. 17	560	7.50	35.7	4.76		Cold heat
Dec. 17	561	4.25	31.2	7.03		Blast started
Dec. 17	562	5.25	35.4	6.75		
Dec. 17	563	5.50	35.6	6.49		
Dec. 18	564	5.75	31.0	5.40		12 hours
Dec. 18	565	5.00	34.0	6.80		Sunday rest
Dec. 19	566	5.25	28.3	5.39		
Dec. 19	567	5.00	34.2	6.85	6.03	
Dec. 19	568	4.75	26.8	5.62		
Dec. 19	569	5.75	32.5	5.81		
Dec. 20	570	7.00	35.0	5.00		
Dec. 20	571	5.25	30.0	5.72		
Dec. 20	572	5.00	30.8	6.15		
Dec. 20	573	5.25	31.5	6.00		

The analyses of the waste gases, with badly shut doors, were as follows:

	Per cent. CO_2	Per cent. O	Per cent. CO
Average before applying the blast	13.8	5.2	0.0
After applying the blast	10.2	8.0	0.0

Furnace No. 4 then worked without delays, in the improved method shown, with an average hourly output of 6 tons from December 17 to January 12. Not only was the life of the furnace increased by 25 days, but its hourly output before shutting down was raised by about 1½ tons. The changes brought about in the pressure conditions are shown in Figs. 5 to 8. It is seen that the partial vacuum in both the upper and lower parts of the air regenerators is changed to a positive pressure, by applying the blast. The amount of blast was so arranged that the pressure in the upper part was about equal to zero. As soon as the motor was stopped the former bad conditions prevailed as shown at X_1, X_2, X_3, X_4 and X_5 in Figs. 5 to 8. The tapping times are shown by A_1, A_2, A_3, A_4 and A_5, which indicate the changed time of the length of the heat.

At Donez-Jurjewka, with six furnaces, almost every month one of them is ready for a general repair, and as the blast can almost always render good service at this time, it is used from two to three weeks in the month and very considerably increases the output of the furnaces. It must be pointed out that even with the most careful use of the blast the furnace is strongly attacked, especially the front and back walls over the door arches. For this reason it is not recommended to use the blast before it is absolutely necessary.

Slagging and Filling Up of Regenerators

The remainder of the paper takes up in detail the causes leading to the slagging and filling up of the regenerators. The author's conclusions are summed up in Table 6, which gives the calculated origin of the slag deposits in the slag pockets and checkers under his conditions, based on carefully made average analyses.

Table 6—Slag Deposits in Regenerators

Materials from which the slag has been formed	Percentage of these different materials In the gas regenerators	In the air regenerators
1. Additions, ore and limestone	26.0	37.0
2. Furnace lining	0.8	1.5
3. Open hearth slag	28.2	16.0
4. Silica bricks	45.0	45.5

There is a big difference in the results from the air and gas regenerators. This is obviously due to the higher average temperature of the air chambers, their larger size, the greater space between the bricks of the checker work, and finally the difference in the pressure conditions which cause the gases to pass through the air chambers with greater velocity than through gas chambers. The main conclusion is that it is best to use only hard lump ore, instead of finely divided material.

With old furnaces it is often of great advantage to remove the topmost row or two of bricks. Of course, the furnace has to be cooled down and the greatest care must be exercised so as not to spoil the rest of the checker work.

All these practical helps, however, are only makeshifts toward the real protection of the regenerators. An excellent method is to build the slag pockets larger and across the whole width of the regenerators, as is being done in the more modern furnaces. One thing is certain, namely, that after the port question has been settled by the use of water cooling, changeable ports, or some other arrangement, the perfection and protection of the regenerators is the next one to be taken up. G. B. W.

Statistical Inquiry in the Steel Dissolution Suit

James M. Swank, general manager of the American Iron and Steel Association, and William Gray, statistician of the association, were examined at its office in Philadelphia in the continuation of the hearings in the United States Steel Corporation's dissolution suit, on December 17. Mr. Swank was asked particularly concerning the method of compiling the statistics of the blast furnace capacity of the country, as given in the directories of the association. Reference was made to some furnaces which were included in the directory, but which were practically abandoned. As the owners, in some cases, considered them potentially active, they were still retained in the list. This testimony bore on the computation of the Steel Corporation's share of pig iron capacity.

Mr. Gray's examination related to tables appearing in the annual statistical reports of the association, giving the production of various forms of iron and steel. By agreement of counsel he will prepare tables showing the production of pig iron of various grades by the Steel Corporation from its formation, together with its percentage of the country's entire production. Objection was filed by Steel Corporation counsel to the directories of the association as being hearsay. It was explained by Mr. Gray that the corrections and amendments in succeeding editions of the directories were made by owners of the various plants to whom clippings were submitted.

The Hamilton Malleable Iron Company, Hamilton, Ont., Canada, has been formed with a capital stock of $600,000 consisting of Toronto, Hamilton and Brantford capital. The company has three sites under option in the east and west end of the city. J. E. Hammond, who was with the Pratt & Letchworth Company, Ltd., Brantford, for 12 years as manager, will be one of the directors and assume management of the plant. The output will consist principally of malleable iron castings for railroad and agricultural purposes and miscellaneous work for custom trade. The plant will cost about $250,000 and will be in operation by July 1, 1913. The temporary office of the company is in the Sun Life Building, Hamilton.

The National Acme Mfg. Company, Cleveland, Ohio, is sending out a miniature in steel of a gear blank manufactured on one of its automatics. The actual piece is 2¼ in. in diameter and is cut from a steel bar. Three tools are used in forming it to its finished diameter, and it is drilled, faced, countersunk, reamed and cut-off in the time required for one of the forming cuts.

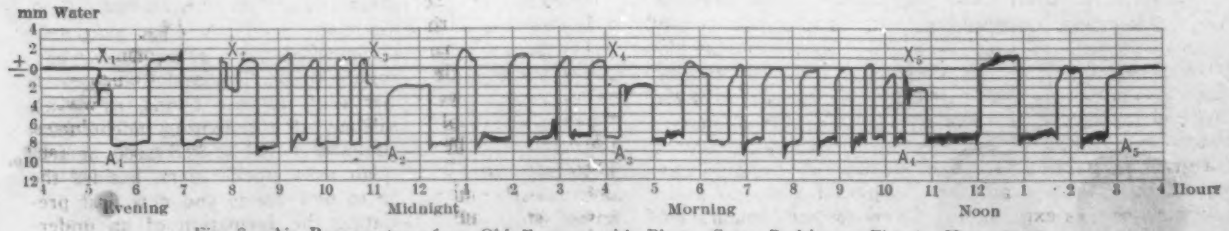


Fig. 8.—Air Regenerator of an Old Furnace; with Blast. Same Position as Fig. 6. Heats 574-8

Commercial Case Carbonizing of Steel

(*Continued from page 1493*)

carbonized part is undesirable when there is the least shock to be reckoned with, because in such instances the excess of carbon exists in the form of films of carbide between the grains of the metal which are brittle and hard, weakening the steel and rendering it liable to fail by flaking off or spawling. Therefore it would be inadvisable to select a practice or a material which produces such a condition in the surface. On the other hand if the carbon percentage is lower than 0.90 to 1.00 per cent. the case will not show its maximum hardness. Therefore, when pieces are to remain unground practice should aim at a production of a 0.90 per cent. carbon surface but when a portion of the steel is to be ground off, after the heat treatment, it is advisable to drive in an excess of carbon so as to leave this optimum percentage of 0.9 to 1.00 per cent. in the final surface.

All carbonized zones widen with increase of temperature. While wide gradation zones are desirable from the point of view of tenacity of the case to the core, other considerations enter into the commercial side of the problem. The first is the cost of maintaining the high heats. The factors of fuel cost and increased furnace up-keep cost at the upper temperatures are self-evident. The second is the difference in the nature of the case. Inspection will show that at 1500 deg. Fahr. the width of the eutectic zone is considerably greater than that of the hypereutectic zone and the hypoeutectic zone of the decreasing carbon content is wider still, which means, of course, that the case carbonizing is proceeding gradually and that the case and core are merging into each other by gentle degrees. At 1600 deg. Fahr. the ratio of the high carbon exterior zone to the inner zones rises and at 1700 and 1800 deg. Fahr. the increase is more marked still.

The Lesson That Was Learned

The meaning of all this is that as the temperature goes up carbon is forced by the heat, as it were, to rush into the surface of the steel faster than it can be assimilated by the adjacent grains and so the outside layers at the high heats are gorged with carbon which has not time to diffuse gradually toward the center of the case. This condition of affairs is highly undesirable, because the product then shows a sharp demarcation between case and core, the transition from one material to another being too abrupt; the properties necessarily vary accordingly and in the finished piece have a tendency to set up high physical strains. This causes flaking off of the case from the core, a phenomenon familiar enough to those engaged in the trade. The remedy is to case carbonize at a moderate heat for a length of time sufficient to obtain a reasonable depth of case with gradual transition from case to core. This temperature appears in this experiment to be about 1650 deg. Fahr. with open-hearth carbon steel, 1600 deg. Fahr. with electric nickel steel, and 1650 deg. Fahr. with electric chrome vanadium steel.

In deciding upon the best carbonizing temperature the effect of heat on the size of grain in the steel must also be considered. This, as is well known, is a very decided reaction, the grain coarsening rapidly with increasing temperatures. In this connection a careful investigation showed marked contrast between the behavior of ordinary carbon steel and the two alloy steels; the former began to coarsen rapidly at 1500 deg. Fahr.; nickel steel also showed the same effect at the same temperature but in a much less marked degree and chrome vanadium steel retained its fine grain up to 1700 deg. Fahr. and over, not reaching even at 1800 deg. Fahr. the grain size of other steels. This is in line with the common belief that chromium and vanadium retain fineness of grain in steel.

Chemical Analysis for Depth

Another experiment was to determine by chemical analysis the depth of carbonizing effect and carbon content of several zones of carbonizing effect as affected by the composition of steel under treatment. The information obtained indicated that the higher the carbon content of the steel case carbonized, the higher will be the maximum carbon content of case when case carbonizing is performed at a given temperature for a given time; the original carbon content does not affect the depth of case under the conditions of this experiment; the nickel and carbon steels behave similarly in regard to carbon maximum. Chrome vanadium steel takes a higher carbon maximum than nickel steel and carbon steel under the same case-carbonizing conditions.

A most instructive experiment to determine the commercial efficiency of case-carbonizing materials and the elements which affect their value commercially, fourteen of those materials being selected for the purpose. The results follows:

As these materials are used by volume, not by weight, this volume per ton must be considered in the economic purchase of this grade of material.

All the compounds show shrinkage of volume and in most instances a loss of potency with continued service. This point is of greatest commercial interest since, if steel of variable carbon content is produced in the case-hardening process, the manufacturer cannot hope for uniform results.

With the compounds on the market, any desired maximum carbon content in the case can be obtained with a given temperature simply by varying the compounds used.

When parts are produced which require grinding after treatment, a compound should be selected which gives a high maximum carbon content.

When parts are produced which require resistance to shock after heat treatment, a compound should be selected which gives a carbon maximum sufficient for the hardness desired and not in excess of this amount, or brittleness will result.

The ideal case-hardening compound, as indicated by the experiment, would possess the following characteristics: (1) large volume per ton; (2) small shrinkage per run; (3) high resistivity to change of shape or powdering; (4) cleanliness and freedom from dust; (5) uniform case-carbonizing power at all runs; (6) capability of being used an innumerable number of times.

The information herein presented was obtained with the object of pointing out: (*a*) the quantitative effect of the commercial irregularities which creep into case-carbonized steel parts; (*b*) the precautions which must be observed if uniformity is desired; and (*c*) the physical characteristics in case-carbonizing materials which must be considered if low cost for this operation is to be obtained.

The ideal case-carbonizing compound perhaps has not yet been produced; however, compounds which are clean, mechanically strong, uniform in case-carbonizing power, and capable of unlimited re-use are being commercially employed in case-carbonizing operation.

Machine Tool Exhibit at Automobile Show

It has been decided by the Show Committee of the National Automobile Show, which will begin January 11 in New York City, to transfer the exhibit of machine tools which will show the actual manufacture of motor car parts to the second week of the exhibition, and to place it in Madison Square Garden instead of the Grand Central Palace. Special flooring would be required in the latter building, and for this reason it is believed that the former will be more suitable. This exhibit, under the auspices of the National Machine Tool Builders' Association, will comprise automatic turret lathes and boring, grinding, drilling, and welding machines. Rough castings will be cut down to the finished product. There will be shown in addition a model stock room for the housing of finished and unfinished parts. Some of the exhibitors of parts and accessories will show products made in this miniature plant during the exhibition.

Alabama Consolidated Coal & Iron Company

A plan for the reorganization of the Alabama Consolidated Coal & Iron Company is announced at Baltimore. It provides for an assessment of $30 a share on the preferred and $15 on the common stock. This, and the proceeds of $1,000,000 new 6 per cent. 20-year bonds, of which $550,000 will be sold, will pay off the floating indebtedness of $1,150,000. The capitalization will be $7,869,000, against $6,969,000 now. The plan asks stockholders, besides the assessment, to subscribe to new bonds and new first preferred stock, thus obviating the formation of an underwriting syndicate.

No Government Inspection of Steel Rails

Findings of the Rail and Equipment Committee of the National Association of Railway Commissioners

An important report on steel rails was presented to the 24th annual convention of the National Association of Railway Commissioners held at Washington in November. It was prepared by a committee consisting of James E. Sague, William J. Wood and Charles E. Elmquist, appointed by the president of the association in pursuance of a resolution of the executive committee asking for consideration by a special committee of the question of equipment and rails used by the railroad companies in the construction and operation of the roads of the country. In this letter appointing the committee the president said:

It would seem that a very important matter is that of inquiring into the manufacture of rails to find the cause of so many broken rails, and to determine whether the matter of Government inspection may not be desirable both in the matter of manufacturing rails and the construction of equipment, and perhaps legislation enacted requiring a rigid inspection and more uniformity in the specifications used by the different plants.

The chairman of the committee, J. E. Sague, is a member of the New York Public Service Commission, Second District. The report, largely prepared by him, consists of 67 printed pages, and reviews with a good deal of detail the developments in the steel rail problem in the past year. In lieu of extracts from the report, which may be made in a later issue if space can be found, we present below the committee's summary of its report. It will be noticed in particular that it takes ground in opposition to Government inspection:

This committee was appointed to study the subject of rails and railroad equipment, to report upon the advisability of Government inspection and of legislation to reduce failures, and to consider other questions related to this subject.

Because of the impossibility of covering the entire ground with thoroughness, the committee decided to confine its attention almost exclusively to rails. The study of rail failures and of possible improvements is complicated by various uncertain elements, such as quality of material, weight and speed of locomotives and cars, and track conditions. Experts differ widely, and it has been impossible for the committee to weigh all of the conflicting evidence available or to question experts to the extent necessary to reach positive conclusions. Statements as to causes of failure and suggestions for improvement are therefore advanced as topics for discussion rather than as final conclusions.

Rail Failure Problems Continuous

The suggestions of the committee are given in detail in the report and are summarized as follows:

1. Present rail-failure problems are similar to those of the past. Recent breakage of steel rails develops questions similar to those which were caused by the breakage of iron rails. The problems of rail failure and wear are continuous ones, which have always been serious and will probably always remain so.

2. The statistics of accidents caused by rail failures are incomplete and unsatisfactory. They indicate, however, that the danger from broken rails is not as great as generally supposed. The statistics for a 10-year period indicate very small percentages of casualty from broken rails compared with total accidents to passengers and employees. Broken-rail accidents are much less serious as measured by casualties and destruction to property than collisions.

3. No complete statistics of rail failures are available. The best data are those collected by the rail committee of the American Railway Engineering Association.

4. Many of the smaller roads and branch lines have practically no rail failures, and the problem appears to be principally confined to railroads which handle a large tonnage of heavy and fast traffic. For such lines the statistics show that winter rail breakage constitutes the important problem. The number of rail breakages on main lines handling heavy traffic shows that in winter the factor of safety of the rail under prevailing wheel weights and speeds is small, and it is important to consider every improvement which may increase this factor.

5. Main types of rail failures are "split heads," "broken flanges," and "broken rails." The statistics show great variation in the relative number in each of these classes of failures, although the head failures appear to predominate. Some roads have great numbers of broken flanges; others, such as the Harriman lines, have but little "flange failure."

6. Split heads appear to be caused principally by defective material.

7. Broken flanges appear to be the result of transverse weakness in the base of the rail caused by lamination or seams which develop in rolling.

8. Broken rails are caused by defective material and methods of manufacture, defective track, defective equipment, by injury from locomotives slipping, and other accidental causes. Breakages due to these causes are greatly increased by winter conditions and by high speed.

9. The most dangerous form of rail failure appears to be that caused by the development of internal transverse fissures, such as resulted in the Manchester accident. There appears, however, to be very few of such failures, and further investigation is necessary to determine their cause.

10. The principal elements of defective material appear to be defects near the top of the ingot, due to segregation and piping, and flaws, scattered throughout the ingot, and caused by blowholes, slag and various impurities.

Contributory Track and Equipment Conditions

11. Rail failures in winter are excessive as compared with summer. In New York State the principal kinds of rail failures for three years averaged about 100 per month for nine months and varied from 364 to 895 per month for the remaining months of January, February and March. This variation was apparently caused by variations in the severity of the winters.

12. Defective track conditions cause many rail failures, especially in the winter. The principal contributing defects appear to be bad surface and poor drainage.

13. Defective equipment causes many rail failures especially in connection with heavy wheel weights and high speeds. The most serious cause of failures under this head is "flat wheels." Rail failures due to defective equipment are much greater in winter than in summer, and, in connection with defective track and high speeds, probably constitute the principal causes of increased breakage of rails in winter.

14. High-speed schedules in winter in connection with defective track and equipment is the cause of much rail breakage. Train delays in winter are frequent. Fast trains delay local passenger and freight trains, and the pressure to make up time is much increased compared with summer.

15. The "anvil" effect produced on a frozen roadbed in connection with the defects and conditions before noted appears to be the cause of rail failures in winter rather than any change in the steel which may be produced by cold.

Breakages and Means of Prevention

16. Recent rail breakage as compared with the past is to a great extent due—

(*a*) To the gradual exhaustion of pure ores suitable for the Bessemer process, which has made it necessary to permit the increase of the proportion of phosphorus in the finished rail from 0.06 per cent. to 0.10 per cent., or over 60 per cent.

(*b*) To the rapid increase of wheel weights and speeds brought about by traffic requirements, which has resulted in more severe conditions of service than have ever before been imposed in railroad history.

17. The following are among the methods which will

Machine Shop Developments in Ten Years*

The Progress in the Last Decade in Machine Design, Manipulation and Production and in Shop Equipment and Practices

One of the noticeable changes in machine shop equipment during the past 10 years is the increased weight and power of machine tools, which was made necessary through the general application of high-speed steel cutting tools. While the increased capacity of machines which followed in the wake of the application of high-speed steel was directly instrumental in bringing about such increases in the weight of machines, the result has been beneficial, not only in increased production but in accuracy of product, because of greater rigidity and consequent better preservation of alignment.

Machine Foundations

Progress has also been made in the methods of erecting machinery. With large size machines the foundation plays a most important part in the accuracy of the work produced. For instance, the provision of a massive, well-built foundation for large planing machines is imperative. When not provided, the weight of the machine and work must inevitably cause settling and springing out of shape. Every mechanic knows that such a disturbance of the foundation affects the alignment, which means that the work produced on the machine will be inaccurate. The elimination of defective action due to want of support, and the increased mass and rigidity have in the case of planing machines resulted in the production of plane surfaces closely approaching theoretical planes when the work itself affords the necessary rigidity and uniformity of section. Hence, hand scraping to perfect alignment is not so necessary as it was a few years ago and it may be said that on some classes of work scraping is now largely more of an ornamental than a corrective process. On high grade machines, however, scraping or grinding probably will continue to be necessary to correct inaccuracies of surface and alignment.

Electric Motor Drive

The subject of electric motor drives was given much prominence in discussions of machine shop practice a few years ago, the bias being generally in favor of individual motor drive. While subsequent experience has shown that the direct-connected electric motor has certain limitations and disadvantages for some classes of work, it has also shown that the same results and efficiency cannot be obtained with the group system of driving modern designs of machine tools. The investment in motors is less with the group system but the flexibility of the independent drive is lost. When a machine driven by an independent motor is properly equipped for easy handling increase of production over that of the same machine in a group system is practically insured. One machine tool builder has found it a good rule to apply independent motors wherever the power requirement is 5 hp. or more. Hardened steel gears in the driving train reduce gear troubles to a minimum. When the character of work is constantly changing and new groupings of machines are required from time to time, the individual drive is at great advantage. The machines can then be placed "like men on a checker board."

Automatic Machines

Progress has been made in the development of automatic and semi-automatic machines for the production of duplicate parts from bar stock, iron and brass castings. Many special fixtures have been designed for automatic screw machines which have widened their scope to include a great variety of small parts on which a number of operations must be performed before cutting off from the bar, such as small spiral gears, capstan screws, etc. The cost of production is so greatly reduced that these machines are generally applied where the quantity of work to be produced warrants the cost of installation and tool maintenance.

The scope of other types of automatic machine tools is wide and constantly increasing. A manufacturer of a specialty can, if he chooses, organize on an assembling basis, confining his actual manufacture to the making of a few principal parts. This development is having a marked influence on our export trade.

Training Mechanics

Modern methods of manufacturing are responsible for limiting the employment of men to specific operations only, and pursuit of the plan is making it hard to secure all-around machinists. Young men come into a factory and soon acquire the necessary skill to become proficient drill press operators or milling machine operators. They are able to earn fairly good wages in a shorter space of time than if they served the necessary term of apprenticeship to become competent and all-around machinists. The endeavor has been made in the larger manufacturing cities to offset the narrowing effect of specialized training by the introduction of training schools in which young mechanics are given instruction in the theoretical side of their work. The results obtained by this training are beneficial. Men are acquiring both theoretical and practical knowledge, so that to a limited extent at least they are obtaining the benefits of a technical education coupled with practical training.

Standardization of Tool Grinding

The turning and planing tools in many shops are now ground to standard shapes in the tool room on special tool grinding machines. This method not only saves the time of the machine tool operator, but insures the grinding of all tools to the correct form and it also saves what is of greater value—the loss of the productive time of the machine tool. The stock of tools required for a shop is also much smaller.

Most shops at the present time keep all small tools in the store room except those in actual use. In this way the tools are kept in good condition and a much smaller stock is required. Not many years ago it was quite common for each workman to have his own stock of tools. Consequently there were good tools and poor tools just in proportion as there are good workmen and bad workmen. For instance, a lathe operator had his own stock of mandrels which were made to suit each particular job, and when necessary one man borrowed from another. The result was that the workmen wasted a great deal of time wandering around looking for mandrels and other auxiliary equipment. It may seem somewhat out of place to refer to this well known method of handling small tools by a checking system in a paper on modern improvements, because it is an old feature of many shops. This system was not generally employed 10 years ago in many of the small and medium sized shops.

Speeds and Feeds

The important questions of speed and feed in connection with machining operations have, during recent years, been carefully studied by many superintendents and foremen who formerly relied entirely on the judgment of the workmen, which was sometimes good and sometimes bad. Speeds and feeds are fixed in the planning department and are based on the power of the machine and character of the metal.

More thought is now given to the selection of machine tools for various classes of work. A few years ago many shop foremen used a certain type of machine for a given class of work, because that type had always been used for that purpose. It seems that there is much less conservatism to-day and precedent does not count for as much as it did a few years ago. The tendency is to design the machine for the work instead of adapting the work to the machine equipment.

*From the report of the sub-committee on machine shop practice of the American Society of Mechanical Engineers.

probably be found to be most effective in reducing rail breakage:

(*a*) Improved maintenance of equipment, especially on wheels, and reduction in the number of worn and flat wheels; improved balancing of locomotives; improved track design and maintenance, including effective drainage, ample depth of ballast and uniform tie spacing.

(*b*) The substitution of open-hearth for Bessemer steel, with consequent reduction of phosphorus.

(*c*) Improved methods of manufacture, especially directed to secure sound ingots, sufficient discard to remove the segregated and defective metal at the top of the ingot.

(*d*) Heavier rails and improved sections, and especially sections with heavier bases.

(*e*) Rigid specifications and careful inspection of all details of manufacture.

18. The electric track circuit in connection with the signal system appears to be the most effective method of detecting broken rails and preventing accidents therefrom.

Important Betterment in Rails

19. Much progress has been made by the principal lines in solving the rail-failure problem. The Harriman lines report:

"To sum the matter up, our rails are over eight times better since January, 1910, than they were for three years before that date.

"The causes of our success are, we think, due to improvements in—

"(1) Mill practice: Increased care and vigilance by the manufacturers.

"(2) Rail section: Thicker base and better-balanced section.

"(3) Chemical constituents: Less segregation and better selection of carbon constituent.

"(4) Inspection: More thorough and including all steps of the process, day and night, at much increased cost to us.

"(5) Selection of maker: Placing our orders with those mills which have given us the best product."

20. The final conclusions of the committee are:

(*a*) That present conditions do not require the inspection by the Government of rails and equipment, or legislation concerning specifications or inspection.

(*b*) The most effective governmental method of securing continued improvement in the rail situation is the careful and thorough investigation of all important accidents which may be caused by rail breakage. In this connection it is desirable that each State commission should keep informed as thoroughly as may be practicable regarding the rail failures upon the lines under its supervision.

(*c*) The Government tests of rails and ingots which were begun a few years ago should be continued and special study should be given to rail steel made by the basic open-hearth process.

Decision on Eastern Iron Ore Freight Rates

In a decision given at Washington, December 21, the Interstate Commerce Commission held that the iron ore freight rates from certain points in northern New Jersey and southeastern New York to furnaces in the Lehigh and Schuylkill Valley districts of Pennsylvania are generally reasonable. The case was brought in 1911 by B. Nicoll & Co., New York, and the Wharton Steel Company, Wharton, N. J., against the Delaware, Lackawanna & Western and other railroads. It was alleged that while the rates on Lake Superior and Port Henry ores to eastern furnace districts averaged about 1/3 cent per ton per mile, the rates from Ringwood, N. J., and from Fort Montgomery, N. Y., to the same furnace districts average about 1 cent per ton per mile. The petitioners asked for refunds of what they considered to be excess freight paid in a period of three years, but this was denied by the commission. A suggestion of the commission was a non-haulage charge of 30 cents a ton, irrespective of distance, and the railroads and shippers were asked to agree on rates embodying such an arrangement. In case nothing is arranged within 60 days the commission will make a ruling on the subject.

The Federal Steel Sales Company, Cleveland, has been incorporated with a capital stock of $5,000 by E. E. Andrews, L. G. Jones, Herbert Fisher and others.

Chrome-Vanadium Steel Tires

As the result of exhaustive experiment and research carried on jointly by manufacturers of steel tires and the American Vanadium Company, Vanadium Building, Pittsburgh, Pa., specifications have been prepared for the manufacture of tires of chrome-vanadium steel. They call for steel made by the acid open hearth process, with sufficient discard to insure removal of piping and segregation, and with the following chemical composition: Carbon, 0.50 to 0.65 per cent.; manganese, 0.60 to 0.80 per cent.; chromium, 0.80 to 1.10 per cent; silicon, 0.20 to 0.35 per cent.; vanadium, over 0.16 per cent.; phosphorus, not over 0.05 per cent.; sulphur, not over 0.05 per cent. The higher range in carbon is to be used for switch and freight engine tires and tender and car wheel tires and the lower range for passenger engine tires. The physical requirements for tires over 56 in. inside diameter are: Elastic limit, 95,000 to 115,000 lb. per square inch; ultimate strength, 125,000 to 140,000 lb. per square inch; elongation in 2 in., minimum 15 per cent.; reduction of area, minimum 35 per cent. Tires 56 in. inside diameter and under: Elastic limit, 110,000 to 125,000 lb. per square inch; ultimate strength, 140,000 to 160,000 lb. per square inch; elongation in 2 in., minimum 12 per cent.; reduction of area, minimum 30 per cent. The specifications also prescribe the size of test specimens and the manner in which the physical properties are to be determined, the manner in which heat treatment shall be conducted and the sizes of tires when furnished in the rough.

The American Vanadium Company has issued results of tests of tires made of chrome-vanadium steel by the Railway Steel Spring Company's Latrobe works, the Midvale Steel Company and the Standard Steel Works Company, according to these specifications, which show a performance much higher than tires made of regular carbon steel. The company has also issued photographs of drop tests of such tires and photomicrographs of heat-treated chrome-vanadium steel tires and untreated carbon steel tires which explain graphically the reasons for the much higher wearing qualities of the former.

Service records of chrome-vanadium steel tires on one of the largest railroads, as given by the same company, show that these tires endured for over 100 per cent. more mileage than the regular carbon steel tires on the same class of engine in identical service. The locomotives in question were of the Pacific type, having a total weight in working order of 229,500 lb. and a weight on drivers of 150,500 lb. Flange wear on this type of locomotive on this division was great, and to reduce this flange lubricators were being used. One object of the application of vanadium tires was to determine whether they would overcome this excessive flange wear, and consequently no flange lubricators were used with them. Heat-treated chrome-vanadium steel tires made 121,000 miles before the engine was shopped and were still in excellent condition with good tires. Carbon steel tires, on the contrary, made only 60,040 miles on a sister engine operating in identical service before having to be turned. Both the vanadium and carbon steel tires were applied at practically the same time, the chrome-vanadium set being applied only one month earlier. On account of the flange wear, it was necessary to reduce the diameter of the carbon tire ¾ in. in order to build the flanges up. In hard switching service chrome-vanadium steel tires have shown equally superior wearing qualities. With a view of increasing tire mileage and securing the resulting large saving in cost of maintenance, 36 railroads have recently ordered heat-treated chrome-vanadium steel tires. These are being made under the specifications referred to above.

A Pocket Micrometer Case.—The J. T. Slocomb Company, Providence, R. I., manufacturer of micrometers, has added to its line a special morocco case for micrometers, designed somewhat after the pattern of a smoker's pipe case. The ordinary case of this type is shaped as an oblong box and usually is 2½ x 5½ x 1¼ in. in dimensions. The new case is but 2¼ in. at its widest point and ⅞-in. stick, and narrows down at the thimble end. Altogether it is so small as to be conveniently carried in the pocket. Its finish follows the standard design of the company.

Inspection of Finished Parts

Machine parts are now carefully inspected in many shops by an independent inspection department, whereas formerly the only check on the accuracy of machined work was in the erecting department—if everything could be assembled, the work was considered satisfactory. The more exacting requirements of recent years, however, made necessary the general adoption of a rigorous system of inspection. Thorough inspection and testing are necessary features of interchangeable manufacturing methods; tools and systems have become highly specialized. In the manufacture of firearms and other high grade products 50 to 100 separate tests or gagings on a single part are not uncommon.

In some shops doing work of a miscellaneous character it is the practice to have an inspector go to the machine at the time a job is started to make sure that the workman understands all of the requirements with reference to the quality required in the work that he is to do, instructing the workman as to the degree of accuracy required, the kind of finish, etc., and seeing that he does not make a mistake in reading his drawings, setting his measuring tools, etc. The inspector inspects the work done in the operation in question upon the first piece where there are several pieces to be done, thus avoiding the danger of an error being made on the first piece being repeated on all subsequent pieces. An inspection is also made upon the completion of each operation of the work done on all pieces in the lot for the purpose of detecting any error that may have been made, so that steps may be taken for its correction without delay.

Another improvement in shop practice worthy of mention is the more generous use of cooling mediums on cutting tools, and the provision of distribution systems from a central reservoir.

Better Facilities for Setting Up Work

The up-to-date foreman or superintendent has come to realize that the efficiency of his shop depends largely on the amount of attention given to the little things. The furnishing of proper clamps and bolts to machine tool operators is a case in point. Poor bolts and warped clamps around a machine often double the time required for setting up work. At the present most shops are equipped with proper clamping facilities and, in many cases, clamps of the right shape and bolts of the right length are furnished for each particular job, along with the other tools, such as cutters, reamers, etc.

More attention is given to the relative location of tools in the shop in order that all machining operations can be performed with no unnecessary handling of the work, the aim being to finish parts by advancing them from one tool to another in a direct line without any see-sawing or useless movements. Shops are constructed so that the light will be properly diffused, which makes it easier for the machinist to do accurate work and reduces the amount of spoiled work. The physical comfort of the workmen is also receiving more and more attention.

Drilling Machines

High speed steel has been substituted for carbon steel in the manufacture of twist and flat twist drills with marked improvement in capacity. The speed of drilling has been increased two or three times, if not more. The drilling machine, the most common machine tool, has been redesigned to meet the new requirements, and so rapid are some of the most highly developed machines on the market that holes can be drilled in boiler plate quicker than they can be punched.

The claim is made by engineers who have carefully investigated the matter that 80 per cent. of all the holes drilled in general manufacturing are ¾ in. in diameter or less. The fact is pointed out that general purpose drills with a capacity of from ⅛ in. to 3 in. are not efficient except within a narrow zone somewhere between the two extremes cited, desirable as they are when on deep drilling or on large diameters requiring a geared drive. Hence the general recognition of the importance of comparatively small capacity drilling machines in the equipment of efficient plants.

Multiple drilling machines with 2 to 50 or more drills in operation simultaneously have been developed. Inverted drilling machines with which the capacity of drills is increased largely because of the rapid clearing of chips from the holes are being used with satisfaction, also multiple drilling machines working in several planes simultaneously, making feasible the drilling and reaming of all holes in machine parts such as automobile cylinders at one operation. Another development is the rotary table semi-automatic drilling machines which relieve the operator of lifting and lowering the spindle and engaging and disengaging the feed.

A minor improvement of machine shop equipment which has increased the productive capacity of single-spindle drilling machines is the so-called roller grip drill chuck which enables the operator to insert and remove drills, reamers, counterbores and other tools without stopping the spindle. These chucks are useful for certain kinds of work requiring drilling, reaming and counterboring operations. In the same connection, mention should be made of tapping attachments, stud setting chucks, drill speeders and similar attachments which improve the working range of drilling machines.

The need of the old style reversing countershaft has been eliminated from drilling machines by automatically reversing tapping attachments, automatically opening stud-setters, and many screw-threading operations are now performed on drill presses with special forms of automatically opening dies, at a great saving over the former method of chucking the work on a turret lathe.

Lathes

The improvements in lathes have been chiefly in matters of strength, power and details of construction. Spindles are made larger and are supported in longer bearings, improvements have been made in carriages, tailstocks, tool rests, apron mechanism, stops, ways, spindle noses, gear boxes, change gear and feed mechanisms, etc. Three-step cone pulleys and double back gear headstocks have been widely adopted for high-power rapid reduction lathes, this construction providing a wide range of speeds with simple and efficient mechanism. Quick change gear mechanisms which enable the selection of gear combinations for screw thread cutting to be made practically instantaneous have been generally provided by lathe builders.

The demand for simple lathes, that is lathes without change gears, lead screws and other standard features of complete engine lathes, has not been insistent. Hence we still have the anomaly of thousands of lathes in manufacturing plants that are never used for thread cutting but which have the change gears, lead screws and other parts required for screw cutting. The reason ascribed by one prominent lathe builder is that the application of the simpler mechanism required for feeding only makes comparatively little difference in the cost of a lathe. The elimination of the change gears reduces the number of available feeds. But the chief objection is the loss of inventory value when regarded as second-hand tools.

Wheel Lathes

A remarkable increase of efficiency has been made in locomotive driving wheel and car wheel lathes. Ten years ago, turning the tires of two pairs of drivers was a good day's work, and most railway shops did much less. High-speed steel has worked perhaps one of its greatest triumphs in this field. Tire turning lathes have been developed to equal the capacity of the best steels and the productive capacity has been increased to eight or ten pairs of drivers a day. The increase of capacity of steel tire car wheel lathes is even more marked, having been raised from five or six pairs to 18 or 20 pairs a day.

Drives for Planing Machines

A weak feature of planers and a serious limitation to the power of large planers is the common shifting belt reversing mechanism. On small planers even the shifting belts are objectionable because of slipping and the characteristic squeaking noises, but on large planers their fault is of more serious nature. Wide belts necessary to transmit the required power at practical speeds cannot be shifted from the tight to the loose pulleys and *vice versa* quickly. Clutches of various designs are used with varying degrees of success. The reversing electric motor direct connected to the planer drive has been developed to the point that makes its success assured. Probably this change of drive is the most marked improvement in planers made in recent

years. Many details have been improved and the greater strength and rigidity of the modern planer coupled with excellent workmanship insures accurate work.

Milling Machines

A change in the machines for producing plane surfaces has been going on gradually but surely. Planers, shapers and slotting machines are being displaced by various types of milling machines in manufacturing plants. As plants change from a building to a manufacturing basis the superiority of the milling machine as a manufacturing machine gives it the preference. The development of coarse-pitch teeth milling cutters and of face milling machines are two of the marked improvements.

Single pulley drive with which the maximum power capacity of a given width belt can be transmitted to the machine irrespective of the work spindle speed, and geared speed boxes giving a wide range of positive speeds are other important changes in design. The vertical spindle milling machine has been developed to a high plane of efficiency, especially for small work. Rotary table machines with quick action clamping devices revolving continually while the operator places the work in position and removes the finished parts, are coming into extensive use.

Boring Mills and Boring Machines

The boring mill has taken a commanding place as a machine tool for both light and heavy work. When equipped with turret heads and a proper complement of tools its productive capacity has been made second to none. Convenience of operation, economy of floor space, compactness of design, adaptability to use of lubricants on cutting tools, are some of the advantages of this machine which have been emphasized in the new designs brought out in recent years.

The horizontal boring machine of the bed and carriage type which has been developed practically within the past 10 years partakes of the characteristics of the lathe, milling machine and boring mill, and in the improved designs is superior to any one for certain classes of work. One of many uses to which it is devoted is that of boring jigs and fixtures for interchangeable production. But not only is it useful for jig making but it is peculiarly well suited for manufacturing machine parts interchangeably without the use of jigs. This important fact enables machine tools and similar high-grade machines to be economically produced on the interchangeable plan during the very active period of developing the design.

Magnetism for holding steel and iron parts for grinding, planing and turning operations has been made useful, especially for thin parts that are easily sprung out of shape by ordinary clamping means. Magnetic grinding, planing and lathe chucks have come into common use in plants having up-to-date equipment.

Grinding Machines

The surface grinder, especially the vertical spindle type, has made great strides in the last few years. The improvements in cylindrical grinding methods are also worthy of mention, especially the use of the heavy duty grinder for removing stock formerly removed by a second or finishing cut in a lathe. Grinding stock from the rough as in the finishing of drop forged crankshafts is also a good example of modern practice. The stage has been reached in cylindrical grinding practice which places the cylindrical grinding machine on a co-ordinate basis with the lathe as a tool for finishing cylindrical work.

A feature of cylindrical grinding machines which has greatly increased productive capacity in multiple diameter work is the stop bar or semi-automatic measuring attachment which enables shouldered shafts, etc., to be duplicated without measurement. Machines for internal grinding of non-revolving work with planetary spindles provides for the economical and accurate sizing of engine cylinders and other parts difficult to rotate. Vertical grinding machines and rotary work tables utilizing magnetic chucks or other quick action clamping means for quickly securing and releasing the parts to be ground have come into extensive use for high-grade interchangeable manufacturing. The development of the disk grinder from a mere smoothing machine to a place as a powerful machine tool of great capacity for finishing plane and curved castings from the rough is one of the most interesting phases of modern practice.

Jigs and Fixtures

The development of jigs and fixtures for interchangeable manufacturing has been remarkable. The expansion of automobile manufacture has been enormous and most of the leading concerns employ jigs and fixtures exclusively, thus insuring interchangeability, low production cost and systematic production. Many improvements have been made in the way of clamping devices, standardization of bushings, handles, levers, frames, etc., too numerous to mention specifically. Tool making has been developed on manufacturing lines, and in fact several concerns specialize on the making of tools, jigs, fixtures, punches and dies and produce them exclusively for manufacturing plants.

Gear Making

The demands of automobile users for quiet running gears have imposed on gear makers conditions very difficult to meet. The limits of error in shape and spacing of teeth have been greatly reduced and coupled with the necessity of making highly accurate gears, often has been that of producing them from tough alloy steels heat treated after cutting the teeth. Hardened and case-hardened gears are also demanded with minimum limits of error.

The planing process has been generally substituted for milling in the manufacture of high grade bevel gears, thus producing theoretically correct tooth shapes instead of the approximation possible only by the formed milling cutter process.

Gear hobbing machines have been widely adopted for cutting spur and spiral gears, because of the greatly increased capacity and simplicity of operation. Machines and methods of cutting the teeth of integral herringbone gears cheaply have been developed, thus making this form of gear available for machinery generally in which it has not been commonly used because of high cost of the two-part type. The demand of automobile users for noiseless gears has led to grinding the teeth of gears after hardening to correct form and form grinding generally, including splined shafts for automobile change gear shafts and similar parts. Progress has been effected in the making of gears by the hot rolling process, producing them thus with a minimum waste of material and of exceptional physical characteristics.

Small Tools

The design and manufacture of small tools have been improved principally in details. There has been a tendency to decrease the number of teeth of milling cutters, making possible heavier roughing cuts with proportionately less expenditure of power. While the extreme coarse spacing of the teeth advocated by some leading engineers has not been generally adopted, all manufacturers of milling cutters have to some extent modified the tooth spacing of their cutters. Several special milling cutters with inserted teeth have also been proposed and to some extent adopted. The tendency has been towards the design of easily adjusted removable blade type reamers, and several satisfactory designs have been brought out. The flat twisted high-speed steel drill has been commercially developed and several modifications of it have been placed on the market. The main progress in tap making, perhaps, has been towards a more satisfactory shape of the flute, and several tap makers have made experiments in this direction.

In general there has been an attempt to design inserted cutter tools to a greater extent than formerly. This activity has been prompted largely by the high price of high-speed steel which has made it necessary to make the cutters only from this material, while the body and shanks of the tools are made of machine steel. Many experiments have been made to find the steels best adapted for a given service and the best heat treatment for the selected steels. Improvements have been made in the tangs of twist and flat drills adding strength sufficient to enable them to stand up to the requirements of high-speed drilling and drilling machines.

During the past 10 years the micrometer has become a measuring tool of general use. Many shops supply them from the tool rooms on the workman's checks. As the result of the general use of the micrometer, 1/1000 in. has become the unit of measurement for fixing limits, and a limit of 0.00025 in. is not uncommon in grinding operations. Not only is there a great advantage in the matter of accu-

racy in the use of micrometers over the old style of calipers set to a scale, but there is a considerable saving in time through their use, both in the matter of setting to size and in eliminating the element of uncertainty, permitting the workman to proceed with his work with greater confidence. So general has use of this unit become, and so convenient is it for small dimensions, that a strong movement is under way to make it the standard for measuring wire, sheet metals, etc., in place of the irrational and arbitrary wire and sheet metal gages. One of the largest electrical concerns abandoned the wire and sheet metal gage systems in 1904 and adopted the decimal system in which 1/1000 in. is the limit for use in all specifications of wire, sheet metal, fiber, etc.

Brass Working

The changes in brass working are principally in the development of automatic and semi-automatic machines for machining standard parts made in large quantities. Some of the machines have effected great reductions in cost, cutting in some cases the labor cost to one-fifth or less of that before the change was made. Carbon steel tools still have the call in some plants in preference to high speed steel tools; carbon steel holds a keener edge and is generally more satisfactory for working the brass used in the manufacture of globe valves, cocks, etc. It is claimed, however, that much of the difficulty experienced in using high-speed steel on work of this character is due to improper heat treatment of the high-speed steel, and this contention seems to be borne out in practice, as certain shops doing brass work of this character are using high-speed steel exclusively.

Chucks operated by compressed air have made a great improvement in the operating efficiency of brass lathes. The work can be chucked and removed without stopping the work spindle, thus saving the time and strength of the operator. The development of the air chuck has taken place chiefly within the past few years, and it is one of the principal improvements made in hand operated turret lathes.

Press Working

Press working machines, punches, dies and other tools have developed to an extent not generally realized by engineers in lines not effected. Here again the development of highly specialized methods of manufacturing automobiles has had a marked influence. Crank presses of 1000 tons capacity are in use. Pressed metal forms of large size are a commonplace. But not only has the development been remarkable in point of size, but also in detail of manipulation. Parts requiring several operations, for example, are turned out by multiple plunger presses, one finished piece being formed at every stroke.

An interesting feature of press work is that shapes are produced impossible of duplication by any other known process. In this respect press work differs from most other machining processes; it is possible to duplicate, for example, lathe or planer work by hand tools, but not so many drawing and forming operations in daily use. A branch of press work little known is the extrusion of shells, tubes, collapsible tubes, etc., of copper, brass and alloys. Extrusion of bars in many shapes used in manufacturing locks, small machines, etc., has become a large industry which has been largely developed in recent years. The possibilities of extrusion are practically unlimited, and this process in common with other metal working methods extensively used has an important effect on the practice of shops using the shapes in their products.

Ball Burnishing

Finishing processes are important in giving attractiveness to manufactured goods. Hand methods are slow and costly and the natural tendency is to use automatic mechanical methods for finishing as well as for making. One process of considerable interest because of its simplicity and effectiveness is the steel ball burnishing method, consisting essentially of a tumbling barrel partly filled with the articles to be finished and a mass of hardened steel balls of various sizes.

Welding Methods

An effective process has been introduced extensively during the period covered for welding heavy sections of steel and iron. The thermit process is being successfully used for welding broken locomotive frames, cylinders, crankshafts, propeller shafts up to any thickness and diameter. The fractures are soundly united by a steel bond applied *in situ* at a fraction of the cost of removing the parts, welding them in the smith shop, finishing in the machine shop and replacing. Hundreds of locomotive frames have been welded by this process with almost uniform satisfaction and at a saving of thousands of dollars for labor and loss of service.

The development of oxy-acetylene and oxy-hydrogen welding and cutting torches has given the industrial world truly remarkable tools for building up or cutting apart. The welding of sheet metals is accomplished with speed and evenness hardly possible by any other process, and the cutting of steel or wrought iron is done close to the line and with such rapidity as to equal or exceed the performance of any machine tool adapted for the same work. Recent improvements make possible the cutting of all manner of shapes from steel plates up to 6 in. thickness so close to the outline of the pattern that a light finishing cut suffices to transform the piece into a finished die.

Time and space will not permit going much more into detail, and the following are enumerated without elaboration: Introduction of ball bearings in the construction of machine tools, effecting a saving of power, increasing the efficiency of operation and capacity through reduction of bearing widths; development of cam grinding machinery and attachments making possible the rapid and economical production of camshafts having cams integral with the shaft; development of the dynamic balancing machine and the general recognition of the need of dynamic balancing for high-speed revolving parts; artificial production of highly efficient abrasives or cutting particles for grinding wheels and improvements in grinding wheel manufacture; development of improved lubricating systems for machine tool bearings; development of machine tools to their utmost capacity by providing means for working the tools all the time, employing extra men to prepare work and also by tooling the machines to bring them up to their highest productive capacity; development of spline milling machines for cutting keyways, key slots, drift holes, cam grooves, recesses, etc.; finishing square, hexagon and other shape holes by the broaching process, insuring interchangeability and rapid production at low cost; general improvement in sanitary conditions of shops, improved lighting facilities both by day and by night through the use of saw-tooth roofs, large windows fitted with metal window frames, improved electric lights and means of distribution; provision of lockers, and the establishment of shop restaurants in localities that formerly had nothing better than the corner saloon.

Prizes for Papers on Welding.—The Zentral Bureau für Azetylen und Autogene Metallbearbeitung in Nürnberg, Germany, Gugelstr. 54, has offered prizes of 1000 and 500 marks for answers to the question, In what way may slag inclusions and hollow places, as well as overheating of the metal during autogenous welding, be proved, without harming the welded places? The contest is open until July 1, 1913. There are to be six judges including Dr. Wüst, of Aachen, and Dr. Schlesinger, of Charlottenburg.

The final papers have passed conveying the plant of the St. Louis Blast Furnace Company, recently sold under foreclosure, to the State National Bank of St. Louis, representing the bondholders, the United States court having approved the sale. The bank represented $200,000 of bonds and has been in receipt of inquiries as to the property, which it is expected will result in a sale to new parties with the intention of operating.

The Middle States Company, Erie, Pa., has been incorporated with a capital stock of $60,000 and will operate a foundry for the manufacture of brass, bronze, aluminum, iron and steel castings and will also deal in foundry supplies, mill machinery and tools. M. W. Brundage is president.

The Erie Steel Construction Company, Erie, Pa., has been incorporated to fabricate and erect structural steel work, construct foundations for buildings, etc. W. E. McCain is president of the company.

The Machinery Markets

The trade situation reflects the usual end of the year dullness as far as new business is concerned. New York, while quiet, anticipates a speedy renewal of activity after January 1, basing the belief on prospects already in hand. In Philadelphia the best activity has been in power equipment. New England is quiet with dealers, but its machinery makers are busy. Machine tool prices are showing a more general tendency to advance in Cleveland where, however, the trade has been rather inactive. Demand has been fairly active in Detroit considering the season. In Chicago the sales of the week were very satisfactory, the Elgin, Joliet & Eastern Railroad having made some large purchases, while manufacturers have also added to their equipment. The Central South is exceptionally brisk for this time of year, and some orders have been placed which were not expected until after January 1. St. Louis indications point to a renewal of activity after January 1. On the Pacific coast small sales have been fairly numerous, while the Southern Pacific Railroad has bought a number of tools for its Oregon shops and has a small list out also.

New York

NEW YORK, December 24, 1912.

While new business is temporarily at low ebb as is invariably the situation with the machinery trade in the Christmas holiday season, a very general feeling of optimism exists as to 1913. Manufacturers, of course, are very busy with the accumulated demand for their products and extra time must still be had before deliveries can be made on some types of machines. In discussing the outlook, the trade points with satisfaction to the fact that prospects pending, both large and small, which will be carried over into next year will culminate in an excellent volume of business when they are converted into orders, and this, it is believed, cannot be many weeks away. Included in the business which will materialize in 1913 are the large railroad lists recently issued. Jobbing foundries in and near New York are feeling a falling off in new demand and while still busy with orders booked in the last few months are not rushed as they were a couple of months ago.

The Strong Rubber & Asbestos Company, of New York City, has purchased through Feist & Feist, Newark, N. J., a newly constructed fireproof factory 100 x 125 ft., 45 to 53 Bigelow street, Newark. It is understood that the company will move its present equipment to the new plant and will employ about 150 men with the expectancy of doubling this number in the near future.

The Dilts Machine Works, Inc., Fulton, N. Y., has been incorporated with a capital stock of $100,000, and will establish a factory and manufacture and deal in machinery, tools, etc. F. B. Dilts, B. W. Bennett, Fulton, N. Y., and A. B. Page, Oswego, are the directors.

The De Grasse Paper Company, Carthage, N. Y., has completed plans for an addition to its plant to be built early next spring. J. A. Otterson is president.

The Wheeler Bros. Brass Foundry, Troy, N. Y., has been incorporated with a capital stock of $15,000. Joseph Wheeler and Henry Wheeler are the directors.

H. W. Chubb, Schenectady, N. Y., is building a machine shop 31 x 81 ft., two stories, at 1040 State street.

The Pawson Engineering & Construction Company, Palmyra, N. Y., has been incorporated with a capital stock of $100,000 and will engage in electrical engineering and construction work. The directors are Philip Weigel, Jr., Ralph E. Greeley and N. R. Van Booskirk, of Palmyra.

Morgridge & Friscus, Mertztown, N. Y., have recently incorporated for the manufacture of rugs, etc., and are completing arrangements for the erection and equipment of a factory.

The Ingle Machine Company, 375 St. Paul street, Rochester, N. Y., has increased its capital stock from $70,000 to $110,000.

The Taylor Instrument Companies, 95 Ames street, Rochester, has commenced work on a factory addition 40 x 270 ft., one story, to cost about $40,000.

The Deposit Electric Company, Deposit, N. Y., will be in the market soon for equipment consisting of one 250-kw., 2300-volt, 60-cycle, 200-r.p.m. generator and exciter and one generator panel for switchboard.

The Akron Plaster Board Company, Akron, N. Y., has been incorporated with $30,000 capital stock to manufacture and deal in plaster board, etc., and will build a plant for the purpose. Robert C. Rose, Geo. J. Ralph, Akron, N. Y., and George McKay, Caledonia, N. Y., are the incorporators.

The city of Oneonta, N. Y., has had plans prepared by F. M. Gurney, city engineer, for a sewage disposal plant which it proposes to construct with two Imhoff tanks. The estimated cost is $90,000.

Plans are being prepared by the Remington Arms & Ammunition Company, Ilion, N. Y., for an addition to its manufacturing plant to be 40 x 300 ft., three stories. A transformer building will also be erected to house transformers, with a capacity of 2500 hp. The building will be equipped with a traveling crane.

The city of Oswego, N. Y., Charles H. Snyder, city engineer, will receive bids in about 60 days for the construction of two sewage disposal plants in connection with sanitary and storm water sewers on both sides of the river. The total cost of the improvement is estimated at $200,000.

The notice which appeared in the issue of *The Iron Age* of December 12 stating that the Littlefield-Clark Company, 21 Illinois street, Buffalo, had been appointed sales agent for the Asbestos Protected Metal Company of Beaver Falls, Pa., manufacturer of asbestos protected roofing and siding, for the territory of Weston, N. Y., should have read for the territory of Western New York.

Jacob Mante & Sons, Buffalo, N. Y., are building a 1-story brick addition to their machine shop on Kane street.

The Republic Hose Coupler Company, Buffalo, has been incorporated with a capital stock of $30,000 and will establish a manufacturing plant.

The Niagara Machine & Tool Company, Buffalo, is erecting a one-story steel pattern shop and storage building at its plant on Northland avenue and the New York Central Railroad belt line.

The American Radiator Company, Buffalo, is building a pattern shop and pattern vault at its bond plant, Rand street and the Lackawanna Railroad, to cost, with equipment, $15,000.

The Buffalo Standard Ink Corporation, Buffalo, has been incorporated with a capital stock of $20,000, and will build and equip a manufacturing plant. The directors are E. Earle Root, C. M. Root and H. H. Betchter.

The Fedders Mfg. Company, Buffalo, automobile radiator maker, is building an addition to its plant at Tonawanda street and West avenue.

The Buffalo Cereal Company, Buffalo, is making alterations and additions to its milling plant at Abbot Road and the Erie Railroad.

The Standard Structural Steel Company, Buffalo, has been incorporated to fabricate structural iron and steel. Moses L. Wallens, E. Rubenstein and Pasquale L. Cimini are the incorporators. Temporary offices, 239 Cedar street.

In an item in *The Iron Age* of December 19 referring to the Holt Mfg. Company, Stockton, Cal., the address was incorrectly given as Stockland, Cal.

New England

BOSTON, MASS., December 24, 1912.

The dealers report that business has been rather quiet for the last week, and they look for little improvement until after the first of the year. The condition is that which always exists holiday time and has no significance. With the manufacturers of machine tools and allied equipment there seems to be little complaint. Some of them are not as busy as they were, but apparently they are glad of the opportunity to replenish stocks which had been seriously diminished. Industrial stocks in New England maintain the strong position which has characterized them in recent months. Announcement of dividends shows that stockholders will get their full returns as usual and in some instances extra dividends will be declared. An example of this is the Standard Screw Company, Hartford, Conn., which a year ago paid a semi-annual dividend of 1 per cent. on the common stock and which has this year

increased the return to 2 per cent., in addition to the regular semi-annual dividend of 3 per cent. on the preferred stock.

The Prentiss Tool & Supply Company has moved its Boston quarters from 145 Oliver street to 49 Federal Building, which is the new part of the John Hancock Building. The location is at Federal, Franklin and Devonshire streets and is one of the most desirable in the business section of the city. The company will in the future carry all its stock at the main warehouse at Jersey City and will ship from that point, as has been its custom with its other offices for some time. The Oliver street store has been leased by Houghton & Richards, importers of tool steel, who move from diagonally across the street.

Amasa Trowbridge will be the general manager of the reorganized Rhodes Mfg. Company, Hartford, Conn., which takes over the business of L. E. Rhodes, as mentioned last week. Mr. Trowbridge has been manager of the Veeder Mfg. Company for five years. The other directors are Leverett E. Rhodes, founder of the business, and Arthur I. Jacobs, head of the Jacobs Chuck Company.

The change in name of the Gaynor & Mitchell Mfg. Company, Bridgeport, Conn., manufacturer of sheet metal goods, to the Gaynor Mfg. Company, has no significance as to management. Although the corporation is now legally resident at Stratford, being just beyond the border line of Bridgeport, the company will maintain Bridgeport as its business address.

The port directors of Boston are making plans for what will be the largest dry dock in the Western hemisphere and work will begin upon it as soon as possible, so that it will be ready for use within three years. It will constitute an important element in the extensive improvements authorized by the State Legislature, which has appropriated $8,000,000 for the general purpose. The first addition to Boston's shipping facilities will be the reconstructed Commonwealth Pier. The dry dock is next. It will be, according to the plans, 1180 ft. long, 100 ft. wide at the locks and 175 ft. within, and will have a depth of 30 ft. with a maximum depth of 39½ ft. at the sills at high tide. A second dry dock will be built later, but this will be somewhat smaller, the length being 900 ft.

The Waterbury Hair Spring Company, Inc., has been organized with a Connecticut charter to manufacture all kinds of hair springs for watches, clocks, steam and electric gauges, etc., with phosphor bronze springs as a specialty. George Hartley is president, Thomas Mahony, vice-president and general manager and C. H. Hartley, secretary and treasurer. The Messrs. Hartley are the original manufacturers of hair spring wire in this country, and have had 20 years' experience, while Mr. Mahony has been with the Waterbury Clock Company for 25 years.

Philadelphia

PHILADELPHIA, PA., December 24, 1912.

Some merchants, as well as manufacturers, have closed a number of pending orders, bringing the week's business to a fair average. While the tendency has been toward hesitancy, some users of equipment have been forced into the market for additional equipment by the urgency on the part of their customers for deliveries on finished products. New business develops rather irregularly. The railroad demand is light, with occasional small inquiries from local roads. Buyers appear less disposed to make broadcast inquiries, but after deciding upon the equipment wanted, go direct to makers or merchants representing manufacturers of the particular equipment desired. A slightly better volume of business developed in power equipment, but usually in small units. Second hand tools and machinery, particularly the smaller standard class of equipment, has been in pretty fair demand. Both iron and steel casting plants are receiving a good proportion of new business and continue to operate on a very satisfactory basis. Steel casting makers are the most active.

The Pennsylvania Railroad has inquiries out for a pipe threading machine, a bolt cutter and several small lathes.

The National Ammonia Company, Van Kirk street and the Delaware River, is making a two story brick addition, 21 x 40 ft., to its present machine shop. It states that it will not be in the market for any additional equipment, but will rearrange its present layout to occupy the new addition when completed.

Builders are figuring on reconstruction work, following a recent fire at the plant of R. C. Remmey's Sons & Co. Two brick buildings, one 50 x 94 ft. the other 16 x 187 ft., will be erected. The concern manufactures fire brick and special fire clay products.

The Reliance Machine Works has been incorporated under Pennsylvania laws with a capital stock of $10,000. Harry A. Wallace, 1716 Unity street, E. B. Latch and S. D. Latch are interested.

Harry Loeb, H. G. Loeb and Harris Abrams will make application on December 28, under Pennsylvania laws, for the incorporation of the Keystone Wrecking Company, acting as general wrecker, contractor and dealer in second hand machinery, tools and metals.

The plant of the Loomis-Manning Filter Mfg. Company, Twenty-fourth street and Sedgely avenue, was badly damaged by fire December 20. The loss has not been fixed, but it is known that the machinery is badly damaged. Plans for the rebuilding and re-equipment of the plant have not yet been decided upon. It is possible that a new plant may be acquired.

The Larkin Company will build a 12-story warehouse at the corner of Twenty-third and Arch streets. It will be 166 x 137 ft. and of fireproof construction. Ballinger & Perott will be the supervising engineers.

The Berger Bros. Company, 237 Arch street, is taking bids for an addition to its power house on Broad street. It will replace its present gas engine power system with that of steam. It has purchased a 100 hp. boiler and an 80 hp. engine and will use exhaust steam for heating purposes. It has also decided to begin operations on its proposed new warehouse early in the spring.

Ballinger & Perott, engineers, are preparing to take bids for considerable power equipment to be installed in the power plant at the Academy of the Sisters of the Immaculate Heart of Mary, Frazer, Pa. Among the equipment required will be four 100 hp. boilers, engines, generators, pumps, feed water heater, pressure pumping system, blowers, fans, steam heating and electric lighting systems.

The Matheson Automobile Company, Wilkes-Barre, Pa., has, it is stated, been placed in the hands of a receiver, William C. Shepherd, president of the company, being named. It is reported that the liabilities are $600,000 while nominal assets are $1,000,000. The inability of the company to realize quickly on its assets is given as the reason for the receivership.

Application for a charter under Pennsylvania laws will be made December 27 for the incorporation of the Wyomissing Valley Railway Company, which will construct and operate an electric railroad, three and one half miles long, in Berks County, Pa. The road will connect with lines operated by the Reading Transit Company, lessee, Reading, Pa.

The Baldwin Locomotive Works now has a greater working force at its various plants than ever before. At Eddystone, Lewistown and the local plant a total of 19,250 employees is enrolled, exceeding the former high mark in 1907 by over 300. The company has sufficient business on its books to keep it busily engaged for the greater part of the first half of next year. Its new erecting shop at Eddystone is now in full operation. Recent large orders taken include one from the Atchison, Topeka & Santa Fe Railroad for 45 engines. An exceedingly good run of small orders is reported.

Chicago

CHICAGO, ILL., December 24, 1912.

The customary sentimental acceptance of dull and decreasing business in December is without basis in fact in the machinery trade, the sales of the past week having been unusually satisfactory in volume. The Elgin, Joliet & Eastern Railroad has purchased a considerable portion of the large list of machines for its new Joliet shop and a number of transactions with general manufacturing interests have been closed. In northern Illinois orders were placed aggregating $15,000 and from Michigan and Indiana a number of sales, including several large tools, are reported.

The new Machinery Hall at the corner of Clinton and Washington streets into which the E. L. Essley Machinery Company will move its salesrooms, is nearly completed and is expected to be ready for occupancy in January. Other tenants of the building include the Sterling Emery Wheel Company and Goodell-Pratt Company.

The Oxweld Acetylene Company, Chicago, with plants at East Chicago and in the East, is about to build a plant at Detroit for which an expenditure of $500,000 is contemplated.

The plant of the Pioneer Pole & Shaft Company,

Oakland City, Ind., is to be increased with the addition of a department for finishing iron parts.

The Overland Mfg. Company, 127 N. Dearborn street, Chicago, has been organized with a capital stock of $2,500 to engage in manufacturing and selling machinery. The incorporators are Henry E. Simon, Albert E. Dennis and A. Barnum.

The Union Iron Works, Decatur, Ill., has been incorporated with a capital of $60,000 to do a general foundry business. The organizers are Frank J. Temple, Porter J. Milliken and H. C. Dempsey.

The Chicago Sheet Metal Company has been consolidated with a similar industry at Brazil, Ind., and the new organization will be known as the Brazil Sheet Metal Mfg. Company. The new company is buying additional equipment.

The Davis Milk Machinery Company, North Chicago, Ill., whose plant was built only recently, is planning to double its present capacity.

The machine shop of the Pittsburgh, Fort Wayne & Chicago Railroad at Fort Wayne, Ind., is being remodeled and enlarged and new machinery will be installed.

The Shelton-Tatter Machine Mfg. Company, Chicago, has been incorporated with a capital stock of $5,000 by Guy S. Shelton, Lewis Tatter and Daniel L. Madden.

The Chicago Steel Foundry, South Kedzie avenue, Chicago, has taken out a permit covering the erection of an addition 41 x 161 ft.

The Furness Bros. Company, 2719 West Lake street, Chicago, has had plans prepared for a two-story machine shop to be 25 x 75 ft. and to cost $7,000.

The Austin-Western Road Machinery Company, Chicago, has been incorporated with a capital stock of $20,000 to handle road machinery and tools.

The Interstate Equipment Mfg. Company, 53 West Jackson Boulevard, Chicago, has been organized with a capital stock of $5,000 to manufacture and deal in electrical equipment. The incorporators are Henry H. Russell, J. W. Fay and H. C. Kribs.

A. J. O'Leary & Son, West Lake street, Chicago, are about to build a factory addition to their iron and steel jobbing warehouse at a cost of $50,000.

The Aledo Machine Company, Aledo, Ill., has been incorporated and has under way some new building construction.

The Waukegan Motor Boat Company, Waukegan, Ill., has been organized with a capital stock of $100,000 by E. C. True of Milwaukee. The company will build a plant at Waukegan.

The Diamond Calk Horseshoe Company, Duluth, Minn., is preparing for an addition to its plant to accommodate its increased business.

The Gilson Grain & Lumber Company, Gilson, Ill., has been incorporated with $35,000 capital stock for the purpose of developing grain elevator and lumber mill interests controlled by the incorporators, who are A. R. Anderson, F. S. Brooks and W. R. Guyer.

The Velie Motor Vehicle Company, Moline, Ill., has increased its capital stock from $400,000 to $600,000 for the purpose of increasing its capacity and operations.

Cleveland

CLEVELAND, OHIO, December 24, 1912.

An advance in the machine tool prices appears to be becoming quite general. Following the advance on planers previously announced several makers of lathes, shapers and grinders have announced price advances of between 5 and 10 per cent., and it is stated that other advances are expected to go into effect January 1. Machine tool builders state that their increased cost of labor and material, particularly the former, necessitates the advances. The molders employed in the heavy iron foundries and in the steel foundries in Cleveland have reached an agreement with their employers according to the terms of which their wages are advanced from $3.25 to $3.50 a day. This agreement is to remain in effect until January 1, 1915. The local machine tool market was not active in the week. A limited number of small orders were placed with dealers, but buyers generally are holding up purchases until after the holidays and after inventories are taken. One fairly good inquiry came out from a central Ohio manufacturer, this being for about 30 small tools, including 18 drill presses, six lathes and several other machines. Among new railroad lists recently sent out was one from the Wabash Railroad which has issued an inquiry from St. Louis. The second-hand machinery market is quiet. Considerable second-hand machinery is being offered.

The Standard Automatic Machine Screw Company, 437 Prospect avenue, N. W., Cleveland, will shortly begin the erection of a new plant on Superior avenue. This will be a four-story steel and concrete building 100 x 100 ft. A power plant of 100 x 150 ft. will be required. The company manufactures a general line of machine screw products. It has at present 20 automatic screw machines in operation, but this number will be increased to 60 when it locates in its new plant.

The Presco Mfg. Co., Cleveland, Ohio, recently incorporated with a capital stock of $15,000, has established a plant at 112 Hamilton avenue, where it will manufacture automobile lamps and accessories.

The Burt Mfg. Company, Akron, Ohio, maker of oil filters, ventilators, etc., has recently moved into larger quarters and added considerable new equipment, so that it is prepared to take care of largely increased business. The company reports that its December business will exceed that of any previous December in its history. Its plant is being run night and day to keep up with orders.

The Lorain Brass & Bronze Foundry Company, Lorain, Ohio, is the name of a new concern that has just placed in operation a plant at Washington avenue and the Nickel Plate Railroad in that city. The company will make brass, bronze and aluminum castings. E. M. Gable is manager.

The Ravenna Auto Truck Company, Ravenna, Ohio, is erecting a plant 50 x 150 ft. for the manufacture of the Ravenna auto truck. Frank Traves is president.

The Frost Wire Fence Company, manufacturer of wire fencing and steel farm gates, has moved into a new plant at St. Clair street and the Belt Line Railway, Cleveland. The plant includes a main building 80 x 180 ft. and store room 50 x 150 ft.

The National Quality Lamp Division of the General Electric Company has commenced the erection on One Hundred and Fifty-second street, Cleveland, of a factory building, 80 x 320 ft., three stories and basement. This will be occupied by its metal department. Considerable special machinery of the company's own make will be installed.

The Garford Company, Elyria, Ohio, which has recently enlarged its plant, will shortly begin the erection of another two-story addition 40 x 300 ft. This company has placed orders for engines to double its power plant equipment.

The R. & S. Belting Company, Cleveland, has been incorporated with a capital stock of $10,000 to deal in belting power transmission, elevating and conveying machinery.

It is reported that the Big Four Railroad will shortly begin the erection of car shops at Bellefontaine, Ohio.

The Moore Engineering Company, Cleveland, is preparing plans for a new water works and electric light plant to be erected in Clyde, Ohio.

Cincinnati

CINCINNATI, OHIO, December 24, 1912.

The last report of Secretary Dickson, of the Cincinnati Branch, National Metal Trades Association, was somewhat of a surprise to a number of the local machine tool builders and other manufacturers. This report, for a three months' period ended December 15, showed a 5 per cent. increase in activity over the previous quarter. Using the association's report for three months ended June 15, 1907, the most active period with machine tool builders here, as a standard, 93 per cent. was shown, as against 88 per cent. for the quarter ending September 15. These reports are based on the number of operatives employed, and it is noteworthy that the lowest average was three months prior to September 15, 1908, when only 53 per cent. was shown.

The jobbing foundries are busy, and a number of them have made contracts for machine tool castings for the entire year 1913.

The King Machine Tool Company, Winton place, Cincinnati, will soon be ready to install the necessary machinery in its new addition, previously noted. Practically all equipment has been provided for.

The Wilson Engineering & Contracting Company, Xenia, Ohio, will build a storage and small structural steel fabricating plant at an early date.

The Stewart & Cook Mfg. Company, Cincinnati, has been incorporated with $150,000 capital stock, and will, at an early date, enter into the manufacture of hardware specialties. John G. Stewart and James M. Cook are the principal incorporators.

It is reported that the Pittsburgh Plate Glass Company is planning a large addition to its plant at Mt. Vernon, Ohio.

The National Cash Register Company, Dayton, Ohio, has completed plans for a large branch factory to be erected at Toronto, Canada.

The Phoenix Mill Company, Marietta, Ohio, will soon be in the market for flour milling machinery for installation in a proposed plant to be erected on the site of one recently destroyed by fire.

The Ohio Valley Enamel Company, Shadyside, Ohio, announces that it will rebuild its plant as soon as plans can be made. The company's plant was recently destroyed by fire, entailing a loss of about $50,000, partly covered by insurance.

The Kentucky Utilities Company, Somerset, Ky., will build a new power plant. J. L. Waddle is local manager of the company.

The Odell Mfg. Company, Los Angeles, Cal., with offices in the Fisher Building, Chicago, has decided to build a factory at Marion, Ind., for the manufacture of safety razors and other specialties.

To manufacture tiling, the T. H. Winston Company, Cincinnati, has been incorporated with $10,000 capital stock. Only a small amount of machinery equipment will be required.

It is reported that the American Laundry Machinery Company, Norwood, Ohio, will soon open its branch plant on Spring Grove avenue, Cincinnati, the refitting of which will require considerable power transmission and other equipment.

Detroit

DETROIT, MICH., December 24, 1912.

The demand for machine tools is fairly active and is holding up well for this time of the year, although there is a good deal of disposition on the part of buyers to hold off until after the first of the year. Inquiries are fair and considerable business is in prospect from the automobile and auto accessory manufacturers. In some lines of special equipment the demand is good and manufacturing machinists have an excellent volume of orders on their books. Machine shop supplies are in good demand. Sales of second-hand machinery are scattered and the market for this class of equipment is spotty. A moderate business in both boilers and engines is reported. Both steel castings plants and gray iron foundries continue well engaged. Building operations are normal.

The Armitage Leather Company, Detroit, has been incorporated with $35,000 capital stock to manufacture leather for automobile use. The incorporators are Edwin Armitage, Walter S. Gurd and R. B. Gillespie. The new company has established a plant at 87 West Congress street.

The Walters Machine Company, Detroit, manufacturing machinist, has awarded contracts for the erection of a brick addition to its factory on Belleview avenue.

The Hahn Machine & Specialty Company, Detroit, has been incorporated with $5,000 capital stock to manufacture metal specialties. The incorporators are Constant De Mattia, William Hahn and Edward Gregory.

The Michigan Cash Register Company, Detroit, has placed the contract for the construction of a three-story reinforced concrete factory building 60 x 130 ft., to cost $20,000, which it will erect at Fifth and Porter streets.

The Murphy-Potter Company, Detroit, has increased its capital stock from $50,000 to $100,000. The company is a large manufacturer of brass goods.

The Detroit Armature & Motor Works, Detroit, has been incorporated with $10,000 capital stock by William J. Harting, James S. Keightley and M. E. Reynolds.

The National Tent & Awning Company, Detroit, has been incorporated with $9,000 capital stock to manufacture all kinds of canvas specialties. The incorporators are E. C. Hausner, C. J. Gould and C. E. Bertsch.

The Ely Auto Parts Company, Detroit, accessory manufacturer, has increased its capital stock from $25,000 to $45,000.

The Gladwin Light & Power Company, Gladwin, Mich., has authorized a bond issue of $75,000, the proceeds of which will be used in enlarging and improving the company's plant.

The American Enameled Wire Company, Muskegon, Mich., has been incorporated with $50,000 capital stock by Charles H. Latimer, Samuel C. Farmer and Samuel Garvin. The new company will manufacture enameled wire and has acquired and is now equipping a plant.

Baker Bros., Royal Oak, Mich., manufacturers of gasoline tractors, have acquired factory quarters at 807 Scotten avenue, Detroit, to provide for an increasing volume of business.

Through S. A. Kahn, architect, the Shaw-Walker Company, Muskegon, Mich., has awarded contracts for the erection of a five-story brick and steel addition to its plant.

The Gile Boat & Engine Company, Ludington, Mich., has filed notice of an increase of capital stock from $50,000 to $100,000.

The Alger County Paper Company has been incorporated under Michigan laws with a capital stock of $2,250,000, for the stated purpose of operating paper mills to be located at Munising, Mich. Herbert H. Everard, Detroit, is named as one of the principal stockholders.

The Chicago Belt Company, Chicago, has acquired the plant and business of the Niles Belting & Mfg. Company, Niles, Mich., manufacturer of belting. The new owner is now engaged in erecting a new factory building 66 x 110 ft., two stories. A. C. Kruger has been appointed general manager of the plant.

The Johnson Furniture Company, Grand Rapids, Mich., furniture manufacturers, is having plans prepared for a new five-story factory building which will be erected early in the year.

The Lyons Machine & Mfg. Company, Lyons, Mich., has increased its capital stock from $10,000 to $30,000.

The city of Bay City, Mich., has appropriated the sum of $20,000 for improvements to be made to the municipal electric lighting plant.

The Benzie County Power Company, Frankfort, Mich., has acquired the plant of the Frankfort Electric Light Company and will, it is reported, build a new power dam and make other improvements.

The Cappen & Bertsch Leather Company, Holland, Mich., has under construction an extensive addition to its plant, which will be devoted to the manufacture of sole leather.

The Jesiek Boat Company, Grand Rapids, Mich., has purchased a site in that city upon which it will build a new plant 100 x 106 ft. The new plant will greatly enlarge the company's present facilities.

The Central South

LOUISVILLE, KY., December 24, 1912.

Business is so good with most manufacturers that they have put off the temptation to postpone buying until after the holidays, and have taken the liberty of putting some machinery expenditures on their books for the last month of 1912. This is unusual enough to emphasize the fact that trade is exceptionally brisk and that the outlook is excellent. Power machinery continues selling well, and boilers for heating plants are in particularly good demand. Manufacturers of ice machinery are getting into the midst of their busy season on this line, and report orders from old and new concerns in the field. Machine tools are in good call, and activity in the lumber business is responsible for a satisfactory volume of sawmill and wood-working equipment trade.

Garner E. Dalton has been made president and A. H. Fairleigh superintendent of the Kentucky Metal Products Company, Louisville, which will manufacture a patented metal culvert. The company is licensed by the United States Sheet & Metal Culvert Company, Birmingham, Ala. It has arranged for the manufacture of its product on the property of Stratton & Terstegge, Louisville stove founders and tinware manufacturers, but will buy special equipment for the work. Electric welding apparatus will be included in the requirements of the company, which expects to begin manufacturing within six weeks.

The Louisville Cement Company, which has a plant at Speed's, Ind., plans the enlargement of its packing department, which will involve the installation of additional conveyors. It has just purchased a screw conveyor of the Webster Mfg. Company, the order being placed through E. D. Morton & Co., Louisville.

The Henry Vogt Machine Company, Louisville, has been awarded the contract for two 250 hp. boilers for installation in the 15-story office building being erected in Louisville by John P. Starks. The specifications provide for down-draft furnaces. Ice machinery business with the company is good, recent orders including large installations for the Illinois Ice & Cold Storage Company, Centralia, Ill.; the Hamilton Utility Company, Benton, Ill., and the Purity Ice Company, Louisville. The plant of the Vogt company has been improved by the installation of a water-tube boiler of its own manufacture and a 560-hp. Corliss engine of the Nordberg Mfg. Company, Milwaukee.

The Coral Ridge Clay Products Company, Louisville, recently incorporated with $100,000 capital stock, is now building a brick plant in South Park, a suburb of Louisville. The power equipment has been bought, but the company is still in the market for its special machinery.

The Louisville Fire Brick Company is establishing a new plant at Grahn, Ky., and has let a contract for the special equipment to the Clearfield Machine Shops, Clearfield, Pa.

The Progress Paint Mfg. Company, 826 West Main street, Louisville, will be in the market shortly for several motors to operate paint mills in a factory it is now establishing. The special machinery will be installed by the J. H. Day Company, Cincinnati.

The Southern Motors Company, Louisville, will lease a large garage now being erected by the Fidelity Trust Company, and will install machine tools and a freight elevator. The purchases will be made by G. G. Botts, manager.

Miller, White & Co., Louisville, have incorporated with $5,000 capital stock to operate an automobile repair shop. The concern has secured quarters at Third and Walnut streets and is now buying machine tools. A. W. White is manager.

The Kentucky Utilities Company, which recently took control of the United Water, Light & Traction Company, Somerset, Ky., has authorized the construction of a $75,000 power plant there. Manager J. L. Waddle will be in charge of the improvements.

C. H. Berryman, Lexington, Ky., may be addressed with reference to machine tool purchases to be made for an automobile repair shop being established there by James B. Haggin. Work on the building was started recently.

The power plant of the Clinton Water & Light Company, Clinton, Ky., has been damaged by fire. Repairs are to be made at once.

T. G. Stuart, Winchester, Ky., will shortly begin the purchase of power equipment and pumps for a waterworks plant to be located in Jackson, Ky.

The Smith Lumber Company, Barbourville, Ky., has purchased a large tract of timber in Leslie county, near Whitesburg, Ky., and will erect a sawmill and stave mill. The machinery is to be purchased at once. Nelson Smith may be addressed.

The C. L. Ritter Lumber Company, Huntington, W. Va., has purchased the property of I. T. West, Frankfort, Ky. The company will build a sawmill, requiring power and special equipment, at once, as it is now completing the construction of a railroad which will open up the property.

George Oltman, Whitesburg, Ky., is in charge of machinery purchases for the Whitesburg Canning Company.

Brown & Smith, Harrodsburg, Ky., have been authorized by the City Council to erect an ice factory and cold storage plant. The firm will proceed with the purchase of power and special machinery.

A company is being organized at Munfordville, Ky., for the establishment of an electric light and power plant. A franchise is to be awarded in a short time, following which machinery will be ordered.

The Gibraltar Coal Company, Central City, Ky., is to sink a shaft at Silver Creek, near that city, in the immediate future, and will be in the market for machinery in a few weeks. W. A. Smith is general manager of the company.

The Southern Combing Gin Sales Company has been incorporated at Chattanooga, Tenn., with $50,000 capital stock for the manufacture of cotton gins and other cotton handling devices. Carl White, G. N. Henson and L. M. Gainer are among the incorporators.

The Forked Deer Lumber Company, Jackson, Tenn., with a capital stock of $25,000, will enlarge the capacity of its sawmill, which it recently purchased from John Rose. T. B. Johnson may be addressed.

The International Harvester Company, Chicago, is reported to be planning the erection of a large sawmill at Poplarville, Miss.

John T. Bacon and others have been given a franchise for the erection of a gas plant at Laurel, Miss.

The Stern Foundry & Machinery Company, 1363 St. Thomas street, New Orleans, La., has purchased a site and will establish a foundry and machine shop.

The Hadley Mfg. Company, New Orleans, La., has been incorporated with $25,000 capital stock for the manufacture of a patented sugar cane harvester. A. N. Haldey is president of the concern.

The Polar Ice Company, Knoxville, Tenn., has increased its capital stock from $25,000 to $250,000 and will erect a plant. A. C. Cochran and Jacob Naas are among those interested.

St. Louis

ST. LOUIS, MO., December 23, 1912.

In the machine tool market the past week there was a pre-holiday dullness apparent, for there has been an indisposition apparent on the part of prospective purchasers to send out lists or make purchases until after the holiday and inventory period has passed. At the same time the impressions of the dealers are still that business will greatly improve early in the coming year.

The Ross Power Company, St. Louis, Mo., with $20,000 capital stock, has been incorporated by John W. Mackey, Edgar D. Weiss and Robert M. Zeppenfeld to equip a plant for the manufacture of a smoke consuming stoker invented by W. A. Ross of Chicago.

The Central Welding & Mfg. Company, St. Louis, with $30,000 capital stock, has been incorporated by Adolph P. and J. Erker, Robert Bausch, Hugo Wedemeyer, Eugene B. Dyer and C. H. Beiring to equip and operate a metal working plant.

The Mutual Brewing Company, St. Louis, has plans for the construction of a new bottling plant, a storage house and the enlargement of its ice manufacturing plant.

Fire the past week destroyed the manufacturing plant of Albert H. Wood of St. Louis, maker of bakers' supplies and store fixtures.

The E. and F. Steam Laundry Company, Monett, Mo., has been incorporated with $6,000 capital stock and will equip a plant at once, it is reported. The incorporators are W. J. Flemming, J. H. Elliott and T. J. Green.

The Van Zandt Gas Appliance Company, St. Louis, has increased its capital stock from $24,000 to $48,000 for the purpose of extending its manufacturing and other operations.

The Smith's Hardware & Mfg. Company, De Kalb, Ill., with $60,000 capital stock, has been incorporated by Charles F. Smith, T. C. Archer and Alexander A. Lawrence.

The Jonesboro Peanut Hulling & Mfg. Company, Jonesboro, Ark., with $20,000 capital stock, has been incorporated and will equip a plant at once. The stockholders are H. M. Gregory, J. M. Jones and Dan L. Jones.

The Kraemer-Sheffner-Carman Company, Aurora, Ill., with $50,000 capital stock, has been incorporated by H. O. Kraemer, J. C. Sheffner and Roscoe B. Carman to engage in the manufacture of furnaces, metal goods, etc.

The Merchants Ice & Coal Company, St. Louis, has taken out a permit for the construction and equipment of a branch plant at Hodiamont and Etzel avenues to include also a storage house with a capacity of 20,000 tons. The total cost will be about $35,000.

The American Shoe Machinery & Tool Company, St. Louis, has plans for the construction and equipment of an addition to its existing plant.

The Edgar Roberts Mfg. Company, St. Louis, has purchased a lot for an addition to its plant. It manufactures veterinary supplies, medicines, soaps, etc.

The Sheffield Gas Engine Company, Kansas City, Mo., with $150,000 capital stock, has been incorporated for the manufacture of gas engines, etc., by Fred. D. Whiting, Freeman Field and Harris Robinson.

The North Missouri Power Company, St. Louis, with a preliminary capital stock of $2,000, has been incorporated by Harry C. Doehr, John S. Lehmann and Frank H. Nottbusch and has plans for the development of power plants.

The Clyde Engineering & Machinery Works, Gulfport, Miss., has been incorporated with $15,000 capital stock by J. C. Rogers, Robert Wallbillich and W. H. Tippin to manufacture machinery.

The plant of the Specialty Shoe Machinery Company, St. Joseph, Mo., recently burned, will be replaced and will require considerable equipment.

The city of Fayetteville, Ark., has ordered plans for the remodelling of the waterworks plant. W. N. Gladson is consulting engineer. Electrically driven machinery will be used.

The city authorities of Biloxi, Miss., have plans for increasing the waterworks plant and pumping power. E. L. Casanera is superintendent.

The city of Eufaula, Okla., has awarded a contract to the Nick Peay Construction Company, of Little Rock, Ark., for the construction of a $125,000 waterworks system. About $30,000 will be spent for machinery.

The Ward Furniture Mfg. Company, Fort Smith, Ark., has been incorporated with $100,000 capital stock by C. B. Eads, James A. Ward, Jr., and Roscoe McKee.

The American Sash & Door Company, St. Joseph, Mo., recently burned, will rebuild with a three-story

plant and will replace the destroyed machinery.

The concentrating plant of the mine owned by W. Y. Yankie, of Joplin, Mo., and Pyson S. Dines of Denver, Colo., was burned the past week with a loss of $12,000. The plant was near Webb City, Mo., and will be replaced.

The Consumers' Refining Company is reported to have plans for the construction of a $500,000 refinery at Cushing, Okla. The parties concerned are operating through the Shaffer-Smeathers Oil Company of Chicago, Ill.

The Okmulgee Window Glass Company, Okmulgee, Okla., with $100,000 capital stock, has been incorporated by C. F. Lutes and L. S. Shelton of that city and B. E. LaDow of Fredonia, Kan., with plans for a plant at Okmulgee.

The Bank of United States Steel Railway Tie Company, Hot Springs, Ark., has been incorporated for the equipment of a plant for the manufacture of a patented tie. The incorporators are A. Lemoine, R. E. L. Maxey, F. W. Vaughan and M. Kinney.

The Pacific Coast

SAN FRANCISCO, CAL., December 17, 1912.

It is expected that very little business will be transacted within the next three or four weeks, but small sales have been fairly numerous for this season, and the volume for the month has been materially increased by the purchase in the local market of a lot of tools for Southern Pacific Railroad shops in Oregon. The Southern Pacific is also out with another small list, including a drive-wheel lathe, other lathes, milling machines, etc., but there is no certainty when the order may be placed. There is some apprehension that railroad buying may be curtailed owing to the Supreme Court ruling on the Harriman system. Plans are reported for the enlargement of the Santa Fe shop at San Bernardino, Cal., but as this road buys everything at Chicago, local merchants are not interested. Many small inquiries are coming out for tools to be purchased after the first of the year, but on all local business competition is very close, and prices show little stability.

Local machine tool merchants are beginning to realize the advantages of prominent location. B. J. Smith, who recently occupied quarters on First street near Market, reports a marked increase in small business since the move, and the Eccles & Smith Company, also on First street, has placed a machine tool display in a conspicuous position. It is reported that another machine tool firm will shortly occupy a store on Market street.

Woodworking machinery is less active than might be expected, but a revival is expected during the next 60 days. In other lines there is a great deal of figuring, and reports of new construction projects are continually coming out. Several municipalities are coming into the market for supplies, inquiries for power road rollers being noted from Oakland and Santa Cruz, Cal.; for school machine shop supplies, hose and fire apparatus from a number of cities. The "Key Route" railroad announces terminal plans to involve the expenditure of about $7,000,000 within the next few years, and the Sacramento Valley Electric Railroad will let contracts in about 90 days for construction of 160 miles of road. The Calaveras Copper Company also plans a 16-mile electric road between Stockton and Copperopolis, Cal.

Norman B. Livermore & Co. have purchased 10 acres of land for prospective expansion of their car and repair shops at South San Francisco. This company recently sold two Bucyrus steam shovels, and reports the best year in its history for the sale of Shay locomotives.

The Griffiths Machine Works has moved from a temporary building at 105 Fremont street to 155 Fremont street. The installations of several new tools is under consideration.

It is reported that the National White Cement Company has purchased machinery to the amount of $85,000 for a plant near San Fernando, Cal.

The Tulare Grain & Milling Company, Tulare, Cal., announces plans for a lot of new machinery.

The Union Tool Company, Torrance, Cal., is starting work on an additional factory building, and it is reported that equipment will be installed for the manufacture of motor trucks and traction engines.

The Glass Insulator Company, near Anaheim, Cal., is building a new machine shop.

The Good Roads Machinery Company has been incorporated in San Francisco, with a capital stock of $10,000 by N. A. Root, C. E. Kratz, W. C. Schramm, M. C. Rogers and I. R. Skaggs.

The Modesto Mfg. Company, recently incorporated to establish a foundry and machine shop at Modesto, Cal., is preparing to proceed with its installation.

It is reported that a machine shop will be installed in connection with the construction of the north jetty at Humboldt Bay.

The San Francisco Cornice Company is installing equipment at Los Angeles for the manufacture of metal doors and other building specialties.

Johnson & Lantori, Pittsburgh, Cal., have taken a contract to build a dredge for the Sonoma Land Company.

The Archer Automatic Riveting Machine Company, Chico, Cal., recently incorporated, announces that it will start work on a factory in the near future.

F. A. Hihn is preparing to install an electric motor and several new machines in his planing mill at Hollister, Cal.

The Crown Hardwood Company, Manila, P. I., recently organized, with a capital stock of $1,000,000, has secured a concession for a large timber development project, and intends to install a complete outfit, including logging railway, camp equipment, sawmill and planing machinery.

The Blue Ribbon Mfg. Company, Handford, Cal., manufacturer of pumps, which recently incorporated its business, is planning some additions to its existing plant and will soon be in the market for a lathe, shaper, radial drill and a milling machine.

Canada

WINNIPEG, MAN., December 21, 1912.

The volume of machinery business is comparatively small. This, however, is the usual condition in these parts at this season. There have been but few announcements of new industrial plants in the last week, but the outlook for the early spring continues very satisfactory.

R. J. Held, representing the Stover Gas Machine Mfg. Company, an Illinois concern, has been in Winnipeg completing arrangements for the establishment of a branch factory here. The products of the company are soda and gasoline pressure tanks, vapor coolers, steel barrels and allied lines.

It is announced that the Bank of British North America will erect a ten-story office building in Edmonton, Alberta, early in 1913. It will be equipped with all modern office building conveniences and will cost about $1,000,000.

Gordon, Ironside & Fares, Ltd., pork packers, Winnipeg, have decided to erect a branch packing plant and cold storage at Saskatoon, Sask., at a cost of $250,000.

The Canadian Metal Shelter Company, Ltd., has been incorporated in Winnipeg, with a capital stock of $200,000. It will manufacture portable metal buildings and shelters of every description, ornamental and structural sheet metal, iron work, etc.

The Hayes Ornamental Cement Company, Ltd., Coquitlam, B. C., will shortly build a large plant for manufacturing the lines the name indicates.

The Brand Stove Company, Milwaukee, Wis., is contemplating establishing a manufacturing plant at Regina, Sask. The cost is placed at $100,000, and the Regina Council is considering the company's application for privileges.

The Schell Foundry & Machine Company, Alexandria, Ont., is having plans prepared for an addition to its plant.

The National Iron Works, Ltd., Toronto, will build a new foundry for the manufacture of cast iron pipe. The estimated cost is $50,000.

The Forsyth Pulverizer Company, Ltd., Toronto, recently organized, will build a plant for the manufacture of rock crushing and mining machinery.

A four-story addition 30 x 60 ft. is to be made to the factory of the Colonial Knitting Company at Guelph, Ont.

The Peterborough Machine & Lubricator Company, Ltd., Peterborough, Ont., has been incorporated with a capital stock of $600,000 and will build a plant for the manufacture of motors, engines, tools, dies, etc. Edgerton R. Wilson and Alexander Gillespie are among the provisional directors.

The Erie Iron Works, St. Thomas, Ont., is receiving bids for an addition to be made to its plant.

The Herdy Mfg. Company, Toronto, recently incorporated to manufacture motor cycles, etc., is equipping a factory building and will begin manufacturing very soon.

Carroll-Wilson, Ltd., Toronto, has been incorporated with a capital stock of $300,000 to manufacture furnaces, stoves, ranges, pipes, sinks, etc., and will equip a plant for the purpose. Louis E. Carroll and John C. Wilson are among the incorporators.

The Gilbert Motor Boat Company, Brockville, Ont., has been incorporated with an authorized capital stock of $100,000 and will build a factory. Frederick W. Gilbert, James E. Lowry and Samuel J. Kirkpatrick are the provisional directors.

Aluminum Castings, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $40,000 and will equip a plant for the manufacture of aluminum and other metallic products. Thomas H. Sedley, Robert M. Kerby and Robert G. Code are the provisional directors.

Government Purchases

WASHINGTON, D. C., December 23, 1912.

The Paymaster General, Navy Department, Washington, will open bids December 30 under schedule 5058, class 132, for two muffle furnaces, one crucible furnace, two oil cooled transformers and one switchboard. The same department will open bids January 7, under schedule 5045, class 21, for seven electric overhead traveling cranes; schedule 5044, class 11, for one universal milling machine, motor-driven, with vertical spindle milling attachment.

The Bureau of Yards and Docks, Navy Department, Washington, will open bids January 18 for a hydropneumatic elevator to be furnished and erected in the foundry at the Navy Yard, Norfolk, Va.

The Department of Agriculture, Washington, will open bids December 31 for furnishing at the department power house an electric generator and bed plate.

The Department of the Interior, United States Reclamation Service, Washington, will open bids January 22 for furnishing hydraulic and electrical apparatus for the St. Mary storage unit, Milk River project, Montana.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids December 17 for material and supplies for the navy yards as follows:

Schedule 5010, class 171, one hand-milling machine—Bidder 9, Brown & Sharpe Mfg. Company, Providence, R. I., $505; 44, Fairbanks Company, Washington, D. C., $567 and $581; 52, Garvin Machine Company, New York, $568 and $581; 71, Kemp Machinery Company, Baltimore, Md., $480 and $542; 85, Manning, Maxwell & Moore, New York, $595; 88, D. Nast Machinery Company, Philadelphia, Pa., $650.

Class 172, one 42-in. friction back-geared high-speed upright drilling machine—Bidder 4, Aumen Machinery Company, Baltimore, Md., $1,320; 71, Kemp Machinery Company, Baltimore, $1,377; 85, Manning, Maxwell & Moore, New York, $1,790; 91, Niles-Bement-Pond Company, New York, $1,032.

Class 173, two 24-in. Lodge & Shipley patent head screw-cutting engine lathes—Bidder 4, Aumen Machinery Company, Baltimore, Md., $1,441 and $1,583, alternate; 44, Fairbanks Company, Washington, $1,521; 71, Kemp Machinery Company, Baltimore, Md., $1,422; 85, Manning, Maxwell & Moore, New York, $1,551.85; 91, Niles-Bement-Pond Company, New York, $1,223 and $1,398.

Duncan W. Peck, superintendent of the New York State department of public works, Albany, will shortly advertise for bids for the construction of a lift bridge over the Erie Barge Canal at Little Falls, N. Y., as specified in contract No. 107. The estimated cost of the bridge is $124,471. Charles J. McDonough, resident engineer of the canal board at Albany, N. Y., has completed plans for the construction of three piers in the Erie basin at Buffalo in connection with the Erie Barge Canal terminals. Two of these piers are to be 730 ft. in length and 150 ft. in width and one 450 ft. in length and 150 ft. in width. All are to be equipped with railroad tracks, warehouses, traveling cranes, etc. The estimated cost of the work is $1,500,000. Superintendent Peck will in due course advertise for bids for construction.

Employees of the Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio, were presented last week with a bonus of 5 per cent. of the wages they received in 1912. The bonuses ranged from $40 up to $200. The furnace has been blown out for relining and repairs.

Trade Publications

Revolving Portable Elevator.—New York Portable Elevator Company, Jersey City, N. J. Bulletin No. 18. With the aid of illustrations this booklet of 20 pages sets forth the utility of the revolving portable elevator known as the Revolvator in tiering and handling boxes, bales, etc. The booklet is designated "Scientific Tiering with a Revolvator."

Small Tools.—Pratt & Whitney Company, Hartford, Conn. Catalogue No. 7. In a compact heavy paper bound volume of 262 pages, size 4½ x 7½ in., comprehensive and illustrated data are given concerning taps, dies, milling cutters, reamers, punches, drills, etc. Several pages are devoted to tables. Indexed. Accompanying the catalogue is a discount sheet now operative.

Reflectors.—National X-Ray Reflector Company, 235 Jackson Boulevard, Chicago, Ill. Booklet, illustrated, entitled "Greatest Efficiency in Reflection of Light," describes the advantages obtained by using various designs of the X-Ray reflectors in illuminating interiors of all kinds.

Concrete Reinforcing and Furring Plates.—Berger Mfg. Company, Canton, Ohio. Catalogue. Profusely illustrated and containing 82 pages. Descriptive of Berger's Rib-trus, Ferrolithic and Multiple furring plates for reinforced concrete construction, adaptable for roofs, floors, sidings, partitions, etc. Contains also tables and general information of value in using the products described.

Steel Balls.—Atlas Ball Company, Philadelphia, Pa. Catalogue. Contains text and illustrations descriptive of methods used in manufacturing the Atlas balls to insure accuracy and general merit. There are included some tables of ball data that will be found of use to engineers.

Reamers.—The Schellenback-Hunt Tool Company, Cincinnati, Ohio. Circular, illustrated. Devoted to the Acme rigid high speed expanding blade reamers which have an unusually large range of diametral expansion. Includes price lists of reamers and extra blades.

Calendar.—The International Boiler Works Company, East Stroudsburg, Pa. An artistic calendar for 1913 in which is depicted in colors a hunting scene. Size, 11 x 16 in.

Engine Lathes.—Boye & Emmes Machine Tool Company, Cincinnati, Ohio. Calendar. On each of 12 pages are illustrations of the several types of engine lathes made by this company.

Railroad, Mill and Factory Supplies.—Walter A. Zelnicker Supply Company, Fourth and Locust streets, St. Louis, Mo. Bulletin No. 135. A list descriptive of the rails, accessories, locomotives, cars, equipment, machinery, steel products, steel piling, bridges, turntables and supplies offered for sale by this company.

German Chrome Steel Balls.—J. S. Bretz Company, 250 West Fifty-fourth street, New York. Folder. Gives information and prices of imported chrome steel balls made in Germany.

Roller Bearings.—Hyatt Roller Bearing Company, Newark, N. J. December number of the Hyatt Way. Contains the results of a drawbar test made to show the difference in tractive effort between cars equipped with roller and plain bearings.

A Calculating Circle.—An ingenious chart has been devised by George M. Purver, consulting engineer, 146 East Eighth street, Brooklyn, N. Y. This chart is printed in convenient form for desk use. It does away with long multiplication and long division and reduces considerably the work of squaring, cubing, finding square and cube roots, determining areas and circumferences of circles, etc. The author states that after a little practice the computer will be able to read the products of numbers up to eight digits more quickly than can be done on a slide rule which gives only approximate results, the same advantage holding for long division. It is intended for those who make arithmetical calculations, such as accountants, draftsmen, engineers, estimators, statisticians, etc. The chart is for sale by the author at 50c. per copy.

The Lackawanna Steel Company, Lackawanna, N. Y., has completed plans for the enlargement of its No. 2 open-hearth plant by the construction of four additional 60-ton furnaces, with a capacity of 150,000 tons a year. It is understood that construction work will begin at once. The company now has under construction and well advanced toward completion two Talbot open-hearth furnaces of the tilting type, which will have a capacity of about 240,000 tons annually and will be operated under the duplex process in connection with the company's Bessemer works.

Also under construction at Lackawanna a plant for the manufacture of track bolts, nuts and spikes.

Customs Decisions

Universal Plates

The Board of United States General Appraisers has made a decision in the case of George S. Bush & Co., Inc., which is of general application in the classification for duty of open-hearth mild steel universal mill plates. The importations in question were invoiced as "flats." The product is the ordinary rectangular sheet or plate and was assessed by the collector at Port Townsend, Wash., as "plate steel" at 5/10 of 1c. per lb. under paragraph 122 of the tariff act. The importers claimed the merchandise properly dutiable as structural shapes of steel, at 4/10 of 1c. per lb. under paragraph 121. In finding against the contention of the importers, Judge Fischer, in an opinion for the board, says in part:

It is not necessary here to do more than state that "structural shapes of iron or steel" are specified in paragraph 121, while paragraph 122 covers "boiler or other plate iron or steel," "cut or sheared to shape or otherwise, or unsheared," and paragraph 131 specifies "sheets and plates" not specially provided for. It would be profitless to go into the question whether the universal plate is plate steel or steel plate. The particular plate here in question is valued at more than 1.3 and less than 1.8c. per lb., and would thus be subject to duty at 0.5 of 1c. per lb., either as plate steel or as steel plate (paragraphs 122 and 131).

The only issue in the case as presented, then, is whether it would be proper to denominate the material as "structural shapes" under paragraph 121, and to establish this the protestants have sought to show that in the general understanding of the trade the product of the universal mill is not regarded as "plate steel" but as "structural shapes." The universal mill has vertical as well as horizontal rolls and the steel is in that way rolled out to exact width.

The decision goes on to say that the proof submitted by the importers, so far as it seeks to establish a commercial practice, is so meager that the board does not feel justified in finding that plates rolled on a universal mill are by trade custom excluded from classification as plate steel, and covered by the provision for structural shapes. No error is found by the board in the assessment made by the customs authorities and it is affirmed.

Meat Slicing Machines

The board has disposed of a complicated reappraisement case standing in the name of Gallagher & Ascher adversely to the importers. The goods in question consisted of meat slicing machines which were reappraised by a single general appraiser at the request of the collector at Chicago, who considered the appraisement made by the local appraiser too low. This was done on the importer's express waiver of the right to have a hearing at the port of entry and agreement not to contest the result of the reappraisement because of the absence of the goods. The hearing accordingly took place at New York.

The result of the reappraisement was to sustain the entered values, whereupon the collector appealed to a board of three general appraisers. The importers appeared at the re-reappraisement hearing and made no objection to the jurisdiction of the board on account of the absence of the goods. The outcome of the re-reappraisement being unfavorable to the importers, they contested its validity on the ground that the board of three did not acquire jurisdiction because of the absence of the machines. General Appraisers Fischer and Howell, constituting a majority of the board, hold that in view of the importers' express waiver, they cannot dispute the validity of the tribunal's jurisdiction and overrule the protest. General Appraiser Cooper dissents.

Bark Stripping Machines

The United States Court of Customs Appeals has reversed the Board of General Appraisers in a case involving the classification under the present tariff act of large, power-driven machines used for removing the bark from logs. They were imported by the Georgia Pulp & Paper Mfg. Company., and were assessed for duty at the rate of 45 per cent. ad valorem under paragraph 199, as "manufactures of metal not specially provided for." The importer claimed that the machines were properly dutiable at 30 per cent. under the provision for "machine tools." The board upheld this claim. In reversing the board, Judge Barber, in his opinion for the court, says the machines in question are too large to be regarded as machine tools, while their lack of portability further militates against the importer's claim.

Jute Machinery

The court has affirmed the board in a case relating to the classification of jute machinery under the present tariff act. O. G. Hempstead & Son were the importers. The collector classified the machinery under paragraph 199, as "manufactures of metal not specially provided for," although paragraph 197 makes specific provision for jute machinery. The collector based his action on the ground that the machines are capable of being put to uses other than making jute. The board sustained the importer's claim at 30 per cent. ad valorem under paragraph 197. The court upholds this verdict and adds that it is not necessary that the machinery should be of a character to be used solely in the manufacture of jute.

Knitting Machines

The United States Court of Customs Appeals has affirmed the Board of General Appraisers in holding that knitting machines are not "machine tools" within the meaning of the present tariff act. The collector assessed the machines at 45 per cent. ad valorem under paragraph 199, as "manufactures of metal not specially provided for." The Surgical Supply Importing Company, the importer, claimed that, as the machines are operated by hand, they should be regarded as "machine tools," dutiable at 30 per cent. ad valorem.

Exported Railroad Equipment Returned

The court has denied the contention of Emar Goldberg and the Great Western Smelting & Refining Company, asking for the free entry under the present tariff of refuse of completed railroad equipment manufactured in this country, exported to Mexico and then returned. The collector held that the regulations of the Secretary of the Treasury relating to American merchandise returned had not been complied with. He accordingly assessed duty at the rate of $1 per ton under paragraph 118, as scrap iron. The Board of Appraisers found against the claim. The court affirmed that decision.

Arsenic Containers

It was decided that sheet-metal drums imported by A. Klipstein & Co. must stand duty at the rate of 30 per cent. under the provision in the tariff act for unusual coverings. It seems that the coverings contained red arsenic and other compounds. The board decided that they are not the usual coverings for the goods and must stand the duty as assessed.

Acid Boilers

The board has decided that double boiler arrangements used for making acids are dutiable properly at the rate of 45 per cent. under the provision for manufactures of metal not specially provided for. It appears that the boilers are iron kettles with acid-proof enameled inner kettles and plain metal stirring arrangements. It was claimed by the importers that the merchandise should be regarded as kitchen utensils dutiable at 40 per cent. on the value. Judge Fischer holds that the goods are not hollow-ware within the meaning of the present tariff. The collector is affirmed.

A Double-Acting Hack Saw Blade.—Ability to reduce the time necessary to cut a given piece of metal from 30 to 50 per cent. is the special feature claimed for a new type of hack saw blade which is being placed on the market by Alexander Reitlinger, 201 William street, New York City. This reduction is secured by having the teeth run in both directions so that both strokes are cutting ones and there is no loss of time by reason of the return stroke being an idle one. When used in a power-driven frame the saw blade can be reversed so that all the teeth can be used before discarding, and in this case the frame must be one in which the saw is not lifted on the back stroke. For hand operation it is claimed that the sawing is easier and in both cases the cut is said to be very clean.

The Goulds' Mfg. Company, Seneca Falls, N. Y., announces that it has appointed the Mine & Smelter Supply Company, Denver, Colo., agent for the Goulds line of Triplex power pumps. The territory assigned will include all of Colorado with adjacent counties in Wyoming, New Mexico, South Dakota and Montana.

Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET

USE OF RIGHT OF WAY IN COMMON.—Unless the rights of one having a mere right-of-way across land are interferred with by its use by another, he cannot complain of such use. (Michigan Supreme Court, Murphy Chair Company vs. American Radiator Company, 137 Northwestern Reporter 791.)

RIGHTS OF MINORITY STOCKHOLDERS.—Sale of a corporation's property to one of its stockholders will not be set aside at the suit of a minority stockholder, unless fraud in the transaction is established, when it appears that a reasonably good price was obtained and that the sale was sanctioned by the board of directors and a majority of the stockholders. (Nebraska Supreme Court, Forrest vs. Nebraska Hardware Company, 137 Northwestern Reporter 839.)

APPLICATION OF LAWS GOVERNING FOREIGN CORPORATIONS.—Transactions in interstate commerce terminating in Missouri do not constitute such "doing business" in that State as requires a foreign corporation to obtain a license to transact business there. (St. Louis Court of Appeals, Rogers vs. Union Iron & Foundry Company, 150 Southwestern Reporter 100.) A contract made by a foreign corporation in Texas without obtaining a license to transact business in that State is unenforcible there, but suit may be brought in another State in which jurisdiction may be acquired over the other party. (Texas Court of Civil Appeals, New State Land Company vs. Wilson, 150 Southwestern Reporter 253.)

SALARIES OF CORPORATE OFFICERS AND EMPLOYEES.—The manager of a business corporation has no power to increase his own salary, that being a matter for the directors (though formal action by the board is not necessary). His act in raising an employee's salary is binding on the corporation if his customary exercise of such power has not been questioned. (Maine Supreme Judicial Court, Chabot & Richard Company vs. Chabot, 84 Atlantic Reporter 892.)

VALIDITY OF ORE MINING COMPANY'S CONTRACTS.—A zinc mining company's contract to sell and deliver zinc concentrates at the rate of 100 tons weekly for three years, commencing at a future date, was not illegal as being in excess of the corporation's powers, in absence of affirmative proof that it did not have reasonable expectation of producing that quality of ore. Nor was its subsequent purchase of ore from others to fill the contract an excess of corporate power where it failed to produce sufficient from its own mines. (United States Circuit Court of Appeals, First Circuit, Young vs. United Zinc Companies, 198 Federal Reporter 593.)

PASSING OF TITLE UNDER SALE CONTRACTS.—When a contract to sell coal reserves to the buyer the right of inspection before acceptance, title does not pass until he has waived or exercised that right. St. Louis Court of Appeals, N. K. Fairbank Company vs. Illinois Central Railroad Company, 149 Southwestern Reporter 1154.)

RIGHTS UNDER INVALID SALES CONTRACT.—Invalidity of a contract for the sale of articles to a merchant, arising from his agreement not to sell any competing line of goods and to resell at prices fixed by the seller, does not prevent the seller from recovering the reasonable value of the articles sold. (Mississippi Supreme Court, McCall Company vs. Hughes, 59 Southern Reporter 794.)

SALES OF ENGINES.—By retaining an engine for several months, knowing that its capacity was 12 hp. and not 16, as called for by his contract of purchase, the buyer waived the right to rescind the contract, but he is entitled to a deduction from the contract price equal to the difference between the value of the engines of the two capacities. (Kentucky Court of Appeals, Nichols & Shepard Company vs. Wheeler, 150 Southwestern Reporter 33.)

CONTRACTS BY RAILROAD COMPANIES TO FURNISH CARS.—An agreement by a railroad company to furnish a fixed number of cars at certain times for the use of a certain interstate shipper is not violation of the interstate commerce act unless the shipper is thereby given an undue and unreasonable preference over other shippers. (Minnesota Supreme Court, W. H. Ferrell & Co., vs. Great Northern Railway Company, 138 Northwestern Reporter 184.)

VERTICAL CONVEYOR HOIST NOT A "DANGEROUS MACHINE."—An ordinary vertical conveyor hoist in a tool factory is not a "dangerous machine" within the terms of the New York labor law (which forbids the employment of boys under 18 years old in operating dangerous machinery of any kind) where the hoist is operated at a speed of only 1 ft. a second. (N. Y. Cofa, Gallenkamp vs. Garvin Machine Company, 99 Northeastern Reporter 718.)

IMPLIED AUTHORITY OF MACHINERY SALESMAN.—A salesman of machinery has implied authority to agree to set it up and place it in running order, as an inducement to a buyer to purchase. (United States Circuit Court of Appeals, Eighth Circuit, Lamon vs. Speer Hardware Company, 198 Federal Reporter 453.)

WAIVER BY BUYER OF DEFICIENT QUALITY OF GOODS.—A buyer of goods loses the right to rescind his purchase or to defend suit for the price, on account of any deficiency in the quality of the goods, by failing to notify the seller within a reasonable time after delivery that they will not be accepted. (Wisconsin Supreme Court, Oscar Smith & Sons Company vs. Janesville Batting Mills Company, 137 Northwestern Reporter 966.)

CONTINUING OFFERS TO SELL.—DAMAGES RECOVERABLE FOR BREACH OF CONTRACT.—A wire manufacturer's agreement to sell all the wire required by another in his trade at specified prices constitutes a continuing offer to sell until withdrawn, and placing of an order by the buyer constitutes a binding contract for the quantity ordered. Loss of profits to the buyer which he could have earned on a resale are recoverable as an element of his damages for breach of the contract by the seller. (North Carolina Supreme Court, American Steel & Wire Company vs. Copeland, 75 Southeastern Reporter 1002.)

RENEWAL OF CONTRACT BY IMPLICATION.—A contract covering a fixed period, such as a contract of employment for one year, will be deemed to have been renewed for a like period, where the circumstances indicate a mutual understanding to that effect. (New Jersey Supreme Court, Passino vs. Brady Brass Company, 84 Atlantic Reporter 615.) But the mere fact that, on expiration of a fixed term of employment, an employee remains at work does not warrant a presumption that the parties agreed to renew the contract for another period of the same length. (New York Supreme Court, Appellate Term, Moskowitz vs. Mawhinney, 137 New York Supplement 908.)

CARE REQUIRED IN OPERATING TRAM CARS.—A manufacturer is not negligent toward his employees in failing to equip small tram cars with safety brakes, where they are moved by hand power and are of the kind generally used around similar plants, though the tracks were constructed on slight grades. Nor is it actionable negligence to omit to provide a superintendent to direct movement of the cars, that being a simple matter which men of common intelligence can accomplish without instruction. (New York Supreme Court, Second Appellate Division, Kwiotkowski vs. Nichols Copper Company, 137 New York Supplement 586.)

EXEMPTION OF MANUFACTURING PROPERTY FROM MUNICIPAL TAXATION.—On vote of a town to exempt a manufacturing enterprise's property from taxation for 10 years, as authorized by law, the exemption does not commence to run until the plant is located, in the absence of an unreasonable delay in locating it. (Rhode Island Supreme Court, Lonsdale vs. Taft, 84 Atlantic Reporter 795.)

AUTHORITY OF TRAVELING SALESMEN.—A traveling salesman cannot bind himself by contracting for advertisement of his employer's goods unless expressly so authorized. (Arkansas Supreme Court, United States Bedding Company vs. Andre, 150 Southwestern Reporter 413.)

ESSENTIAL OF WARRANTY BY SELLER.—To bind a seller of an article by representations concerning its quality, it is unnecessary that the word "warrant" or "warranty" be used; it is sufficient that it appears that the representations were made by the seller with intent that they be relied upon and that the buyer does rely upon them. (Iowa Supreme Court, Four Traction Auto Company vs. Hurni, 137 Northwestern Reporter 1015.)

RIGHT OF BUYER TO INSPECT GOODS.—When goods bought are before the buyer when he agrees to take them, he waives the right to any further inspection of them before accepting delivery. (Connecticut Supreme Court of Errors, Urbansky vs. Kutinsky, 84 Atlantic Reporter 317.)

ACTS BEYOND POWER OF CORPORATION.—The courts will not interfere with a transaction wherein a corporation has exceeded its charter powers, if the contract involved in the transaction has been fully performed and each party thereto has received what he bargained for. (United States District Court, District of Maryland, Alabama Consolidated Coal & Iron Company vs. Baltimore Trust Company, 197 Federal Reporter 347.)

PASSING OF TITLE TO BUYER.—Title to a shipment made to the shipper's order passes to buyer when he pays the draft attached to the bill of lading. (Alabama Court of Appeals, Veitch vs. V. B. Atkins Grocery & Commission Company, 59 Southern Reporter 746.)

The Republic Rubber Company, Youngstown, Ohio, will shortly install a 1000-kw. direct-connected mixed-pressure turbine. The contract was placed with the General Electric Company.

LIBRARY
WEST VIRGINIA UNIVERSITY